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POLLUTION OF THE NAVIGABLE WATERS OF BOSTON HARBOR AND ITS TRIBUTARIES. PROCEEDINGS OF CONFERENCE HELD AT BOSTON, MASSACHUSETTS ON MAY 20, 1968

Federal Water Pollution Control Administration
Washington, D.C.

20 May 1968

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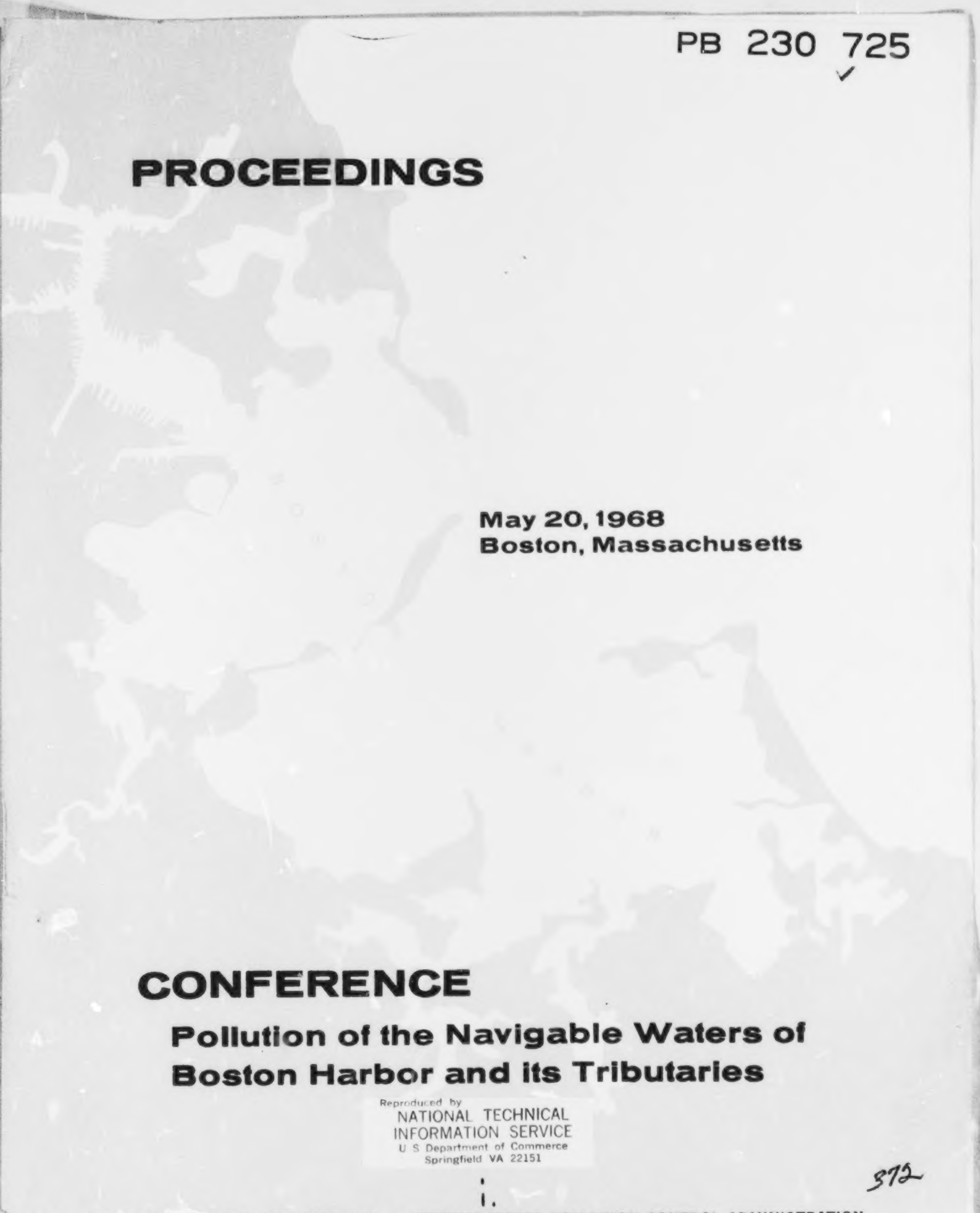

PROCEEDINGS

May 20, 1968
Boston, Massachusetts

CONFERENCE

Pollution of the Navigable Waters of Boston Harbor and its Tributaries

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U.S. DEPARTMENT OF THE INTERIOR • FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

DEPARTMENT OF THE INTERIOR

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

CONFERENCE

IN THE MATTER OF POLLUTION OF THE NAVIGABLE WATERS OF BOSTON HARBOR AND ITS TRIBUTARIES.

Faneuil Hall
Boston, Massachusetts

Monday, May 20, 1968

Convened, pursuant to notice, at 9:30 a.m.

Murray Stein, Chairman	Assistant Commissioner for Enforcement Federal Water Pollution Control Administration U. S. Department of the Interior
Robert L. Yasi	Conferee Commonwealth of Massachusetts
Tom McMahon	Conferee Commonwealth of Massachusetts
Lester Klashman	Conferee and Regional Director Federal Water Pollution Control Administration Northeast Region Boston, Massachusetts.

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Conference in the Matter of Pollution of the Navigable Waters of Boston Harbor and its Tributaries, convened at Faneuil Hall, Boston, Massachusetts, on May 20, 1968.

PRESIDING:

Mr. Murray Stein, Assistant Commissioner for Enforcement, Federal Water Pollution Control Administration, Department of the Interior

CONFEREES:

Thomas C. McMahon, Director, Division of Water Pollution Control, Massachusetts Department of Natural Resources, Boston, Massachusetts

Robert L. Yasi, Commissioner of Natural Resources, Massachusetts Department of Natural Resources, Boston, Massachusetts

Lester M. Klashman, U. S. Department of the Interior, Federal Water Pollution Control Administration, Boston, Massachusetts

Murray Stein, Chairman, U. S. Department of the Interior, Federal Water Pollution Control Administration, Washington, D.C.

PARTICIPANTS:

Mark Abelson, Northeast Regional Coordinator, U. S. Department of the Interior, Boston, Massachusetts

Charles Archdeacon, Winthrop Citizens Group, Winthrop, Massachusetts

Donald Aska, Deputy Regional Director, North Atlantic Region, Bureau of Commercial Fisheries, U. S. Department of the Interior, Gloucester, Massachusetts

Thomas Callaghan, Assistant to the Director, Massachusetts Port Authority, Chairman, Boston Harbor Pollution Committee, Boston, Massachusetts

Edward J. Conley, Federal Activities Coordinator, Northeast Region, U. S. Department of the Interior, Federal Water Pollution Control Administration, Boston, Massachusetts

John F. Flagherty, Commissioner of Public Works, City of Boston, Boston, Massachusetts

Alfred A. Frechette, M.D. (represented by John C. Collins), Commissioner of Public Health, Commonwealth of Massachusetts, Boston, Massachusetts

Frank Gregg, Chairman, New England River Basins Commission, Boston, Massachusetts

Richard E. Griffith, Director, Northeast Region, U. S. Department of the Interior, Bureau of Sport Fisheries and Wildlife, Boston, Massachusetts

Honorable Edward M. Kennedy (read by Doanld Haider, Legislative Assistant to Senator Kennedy), United States Senate, Washington, D.C.

PARTICIPANTS (Continued):

Myron Knudson, Deputy Director, Northeast Water Quality Management Center, U. S. Department of the Interior, Federal Water Pollution Control Administration, Meedham, Massachusetts

Charles Larson, Regional Shellfish Consultant, U. S. Department of Health, Education, and Welfare, Public Health Service, Boston, Massachusetts

Herbert W. Marcus, Chief of Public Relations, Winthrop Citizens Group, Winthrop, Massachusetts

Walter M. Newman, Director, Northeast Water Quality Management Center, U. S. Department of the Interior, Federal Water Pollution Control Administration, Needham, Massachusetts

Charles A. Parthum, Camp, Dresser & McKee, Boston, Massachusetts

James Reid, Assistant Building Commissioner, city of Boston, Boston, Massachusetts

Honorable Elliot L. Richardson (represented by George Spraig), Attorney General, Commonwealth of Massachusetts, Boston, Massachusetts

Jack Roberts, Lewis Yacht Club, Boston, Massachusetts

Honorable Francis W. Sargent, Lt. Governor, Commonwealth of Massachusetts, Boston, Massachusetts

Honorable Ralph E. Sirianni, House of Representatives, Commonwealth of Massachusetts, Boston, Massachusetts

Donald R. Smith, Chief, Planning and Evaluating Unit, Northeast Water Quality Management Center, U. S. Department of the Interior, Federal Water Pollution Control Administration, Needham, Massachusetts

PARTICIPANTS (Continued):

Howard Whitmore, Jr., Commissioner, Metropolitan District Commission, Boston, Massachusetts

OTHERS IN ATTENDANCE:

Mark Abelson, Regional Coordinator, U. S. Department of the Interior, John F. Kennedy Federal Building, Boston, Massachusetts

A. M. Altieri, Chief Chemist, Tileston & Hollingsworth Company, 892 River Street, Hyde Park, Massachusetts

Vyto L. Andreliunas, Assistant Chief, Operations Division, U. S. Army Corps of Engineers, New England Division, 424 Trapelo Road, Waltham, Massachusetts 02154

Mary C. Ansbro, Editor, "Water in the News," The Soap and Detergent Association, 485 Madison Avenue, New York City

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Francis T. Bergin, Sanitary Engineer, Metropolitan District Commission, Construction Division, 20 Somerset Street, Boston, Massachusetts 02108

Arthur B. Blackett, Commercial Wharf Properties, 80 Atlantic Avenue, Boston, Massachusetts

OTHERS IN ATTENDANCE (Continued):

Mario M. Boschetti, Massachusetts State Department of Public Health, Room 511, State House, Boston, Massachusetts

Attorney Joseph Bosco, General Counsel, Water Pollution Control, 31 Summer Street, Everett, Massachusetts

G. B. Bovaird, Cynwyd, Pennsylvania

R. Alan Boyd, Illustrator, Northeast Region, FWPCA, U.S. Department of the Interior, Boston, Massachusetts

Joel Brainard, Systems Engineer, Gibbs & Hill, Inc., 150 Causeway Street, Boston, Massachusetts

Charles W. Brown, Commercial Wharf Properties, 80 Atlantic Avenue, Boston, Massachusetts

Henry Bryson, Inspector, City of Boston Building Department, City Hall, Boston, Massachusetts

Thomas P. Callaghan, Assistant to the Executive Director, Massachusetts Port Authority, 470 Atlantic Avenue, Boston, Massachusetts

Robert Campbell, Marine Biologist, Northeast Marine Health Sciences Laboratory, U. S. Public Health Service, Narragansett, Rhode Island

John B. Casazza, Sanitary Engineer, Massachusetts Division of Water Pollution Control, State Office Building, 100 Cambridge Street, Boston, Massachusetts

A. Russell Ceurvels, Massachusetts Division of Marine Fisheries, Shellfish Purification Plant, Plum Island, Newburyport, Massachusetts

OTHERS IN ATTENDANCE (Continued):

John C. Collins, Director, Division of Sanitary Engineering, Massachusetts Department of Public Health, 511 State House, Boston, Massachusetts

Edward J. Conley, Federal Activities Coordinator, Northeast Region, FWPCA, John F. Kennedy Federal Building, Boston, Massachusetts

Martin F. Cosgrove, Deputy Chief Engineer, Metropolitan District Commission, Construction Division, 20 Somerset Street, Boston, Massachusetts 02108

Jason M. Cortell, Consultant Biologist, 192 Worcester Street, Wellesley Hills, Massachusetts 02181

George F. Cuddy, Deputy Post Engineer, Boston Army Base, 666 Summer Street, Boston, Massachusetts

Samuel B. Cutler, Coordinator, Public Information, Metropolitan District Commission, 20 Somerset Street, Boston, Massachusetts

John F. Dacey, Jr., Assistant Director, Massachusetts League of Cities and Towns, 8 Beacon Street, Boston, Massachusetts 02109

A. F. Dinsmore, Hydraulic Engineer, Gibbs & Hill, Inc., 150 Causeway Street, Boston, Massachusetts 02114

Charles F. Dyer, General Services Administration, U.S. Post Office and Courthouse, Boston, Massachusetts 02109

Frank Elhin, Secretary, Winthrop Citizens Group, 16 Sea Foam Avenue, Winthrop, Massachusetts

Paul Ferraro, Sanitary Engineer, Northeast Water Quality Management Center, FWPCA, Needham, Massachusetts

Alfred F. Ferullo, Massachusetts Division of Water Pollution Control, State Office Building, 100 Cambridge Street, Boston, Massachusetts

OTHERS IN ATTENDANCE (Continued):

Richard Field, Sanitary Engineer, Northeast Division, Naval Facilities Engineering Command, 495 Summer Street, Boston, Massachusetts

David A. Fierra, Civil Engineer, Northeast Region, FWPCA, U. S. Department of the Interior, Boston, Massachusetts

Andrew P. Fisichelli, Principal Sanitary Engineer, Metropolitan District Commission, Deer Island Sewage Treatment Plant, P. O. Box 100, Winthrop, Massachusetts

George A. Flowers, Office of Emergency Planning, Regional Federal Center, Maynard, Massachusetts

Walter Folger, Commander, First Coast Guard District, John F. Kennedy Federal Building, Boston, Massachusetts

Santo A. Furfari, Sanitary Engineer, U. S. Public Health Service, Narragansett, Rhode Island

R. W. Geiger, 3M Company, 3M Center, St. Paul, Minnesota

William A. Gildea, Assistant Director, New England Regional Commission, Post Office and Courthouse Building, Boston, Massachusetts

Santo J. Gozzo, Chief, Enforcement, Northeast Region, FWPCA, U. S. Department of the Interior, Boston, Massachusetts

Richard F. Greeley, Massachusetts Division of Water Pollution Control, State Office Building, Boston, Massachusetts

Frank Gregg, Chairman, New England River Basins Commission, Post Office and Courthouse Building, Boston, Massachusetts 02109

Richard E. Griffith, Regional Director, Bureau of Sport Fisheries and Wildlife, U. S. Post Office and Courthouse, Boston, Massachusetts

OTHERS IN ATTENDANCE (Continued):

Donald Haider, Legislative Assistant to Senator Edward M. Kennedy, Washington, D.C.

David R. Horsefield, Project Engineer, Camp, Dresser & McKee, One Center Plaza, Boston, Massachusetts 02108

Allen J. Ikalainen, U. S. Army Corps of Engineers, New England Division, 424 Trapelo Road, Waltham, Massachusetts 02154

Stanley M. Jacks, Senior Lecturer, Massachusetts Institute of Technology, 50 Memorial Drive, Cambridge, Massachusetts

Stanley C. Joseph, Superintendent, Cape Cod National Seashore, South Wellfleet, Massachusetts 02663

Barkev Kaligian, Construction Grants Program, Northeast Region, FWPCA, U. S. Department of the Interior, Boston, Massachusetts

Joseph C. Knox, Associate, Camp, Dresser & McKee, One Center Plaza, Boston, Massachusetts

Myron O. Knudson, Chief, Field Operations, Northeast Water Quality Management Center, FWPCA, Needham, Massachusetts

Richard P. Kotelly, Civil Engineer, Northeast Region, FWPCA, U. S. Department of the Interior, Boston, Massachusetts

Arthur E. Krigest, Supervisory Auditor, U. S. General Accounting Office, John F. Kennedy Federal Building, Boston, Massachusetts

M. Anthony Lally, Project Engineer, Charles A. Maguire & Associates, 178 Tremont Street, Boston, Massachusetts 02111

Charles D. Larson, Regional Shellfish Consultant, U. S. Public Health Service, John F. Kennedy Federal Building, Boston, Massachusetts

OTHERS IN ATTENDANCE (Continued):

Captain H. F. Liberty, Public Works Officer, Boston Naval Shipyard, Boston, Massachusetts

Mrs. Alex Liveright, League of Women Voters of Boston, 87 Pinckney Street, Boston, Massachusetts

Ronald G. Macomber, U. S. Public Health Service, c/o U. S. Navy Construction Battalion Center, Davisville, Rhode Island

Joseph A. Malgeri, Attorney, Department of Public Works, Waterways Division, 100 Nashua Street, Boston, Massachusetts

Michael Manzi, Attorney, U. S. Army Engineer Division, New England, 424 Trapelo Road, Waltham, Massachusetts 02154

Herbert W. Marcus, Chairman of Public Relations, Winthrop Citizens Group, 5 Myrtle Avenue, Winthrop, Massachusetts

Richard F. Marr, Assistant to the Mayor, City of Boston, City Hall, Boston, Massachusetts

Harold Masterman, Public Relations District Manager, Boston Edison Company, 3600 Prudential Tower, Boston, Massachusetts

Donald J. McGraw, Sanitary Microbiologist, U. S. Public Health Service, Narragansett, Rhode Island

Sally B. Newman, 2641 Webster Street, Berkeley, California

Walter M. Newman, Director, Northeast Water Quality Management Center, FWPCA, 240 Highland Avenue, Needham, Massachusetts 02194

John Nolan, Sales Representative, Allis Chalmers, Park Square Building, Boston, Massachusetts

John O'Leary, Inspector, City of Boston Building Department, 901 City Hall Annex, Boston, Massachusetts

OTHERS IN ATTENDANCE (Continued):

Herbert R. Pahren, Director, Technical Programs, Northeast Region, FWPCA, U. S. Department of the Interior, Boston, Massachusetts

Charles A. Parthum, Partner, Camp, Dresser & McKee, Consulting Engineers, One Center Plaza, Boston, Massachusetts

Joseph J. Pastic, Graduate Student, Massachusetts Institute of Technology, Cambridge, Massachusetts

Richard G. Petersen, Assistant District Chief, Water Resources Division, U. S. Geological Survey, John F. Kennedy Federal Building, Boston, Massachusetts

Lowell S. Pratt, Student, 9 Chestnut Street, Boston, Massachusetts

James T. Reid, Assistant Building Commissioner, City of Boston, 901 City Hall Annex, Boston, Massachusetts

Kenneth J. Ridley, Head, Utilities Engineering Section, Northeast Division, Facilities Engineering Command, U. S. Navy, 495 Summer Street. Boston, Massachusetts

Jack M. Roberts, Lewis Wharf Yacht Club, 63 Atlantic Avenue, Boston, Massachusetts

Mrs. Jack M. Roberts, 63 Atlantic Avenue, Boston, Massachusetts

Francis C. Rogerson, Jr., Partner, Massachusetts Bay Investors Company, 80 Atlantic Avenue, Boston, Massachusetts

J. W. Ryan, Public Information Officer, New England Regional Commission, Post Office and Courthouse Building, Boston, Massachusetts

Edward A. Sherman, Information Officer, Bureau of Sport Fisheries and Wildlife, Post Office and Courthouse Building, Boston Massachusetts

OTHERS IN ATTENDANCE (Continued):

Dr. Carl N. Shuster, Jr., Director, Northeast Marine Health Sciences Laboratory, U. S. Public Health Service, Narragansett, Rhode Island

Ralph E. Sirianni, State Representative, State House, Boston, Massachusetts

William A. Slagle, Jr., Associate Civil Engineer, State Division of Water Pollution Control, 100 Cambridge Street, Boston, Massachusetts

Edwin W. Small, Project Coordiantor, National Park Service, U. S. Department of the Interior, 1400 Post Office and Courthouse Boston, Massachusetts 02109

Donald R. Smith, Chief, Planning and Evaluation Unit, Northeast Water Quality Management Center, FWPCA, Needham, Massachusetts

Harry F. Smith, Jr., Regional Water Supply Consultant, U. S. Public Health Service, John F. Kennedy Federal Building, Boston, Massachusetts

Lester B. Smith, Wildlife Federation, 13 Porter Road, Natick, Massachusetts

Lt. Commander H. E. Stanley, U. S. Coast Guard, Captain of the Port of Boston, 427 Commercial Street, Boston, Massachusetts

Adam E. Sulesky, Director, Sewerage Division, Metropolitan District Commission, 20 Somerset Street, Boston, Massachusetts 02108

Lester A. Sutton, Construction Grants Program Director, Northeast Region, FWPCA, Boston, Massachusetts

Worthen H. Taylor, Water Quality Standards Coordinator, Northeast Region, FWPCA, Boston, Massachusetts

OTHERS IN ATTENDANCE (Continued):

Derrell P. Thompson, Manager, Washington Operations, Environmental Systems Division, Aerojet General Corporation, 1120 Connecticut Avenue, Washington, D.C.

Kenneth H. Walker, Acting Director, North Atlantic Water Quality Management Center, FWPCA, Edison, New Jersey

William J. Walsh, Chief, Pollution Surveillance, Northeast Region, FWPCA, Boston, Massachusetts

Martin Weiss, Sewage Treatment Plant Engineer, Metropolitan District Commission, Deer Island Sewage Treatment Plant, P. O. Box 100, Winthrop, Massachusetts

Howard Whitemore, Jr., Commissioner, Metropolitan District Commission, 20 Somerset Street, Boston, Massachusetts

Don Whittemore, Civil Engineer, Parsons, Brinckerhoff, Quade & Douglas, Inc., 711 Boylston Street, Boston, Massachusetts

Edward F. M. Wong, Shellfish Consultant, Northeast Water Quality Management Center, FWPCA, Needham, Massachusetts

Richard G. Velte, Mechanical Engineer, New England Gas and Electric Association, 130 Austin Street, Cambridge, Massachusetts 02139

Philip G. Vitagliano, Health Officer, Town Hall, Winthrop, Massachusetts

PROCEEDINGS

OPENING STATEMENT
BY
MR. MURRAY STEIN

CHAIRMAN STEIN: The conference is open.

This conference in the matter of pollution of the navigable waters of Boston Harbor and its tributaries, involving the Commonwealth of Massachusetts and the Federal Water Pollution Control Administration, is being held under the provisions of Section 10 of the Federal Water Pollution Control Act.

Under the provisions of the Act the Secretary of the Interior is authorized to call a conference of this type when he finds that substantial economic injury results from the inability to market shellfish products in interstate commerce because of pollution subject to abatement under the Federal Act, and action of Federal, State or local authorities.

The purpose of the conference is to bring together the State water pollution control agency, representatives of the Federal Water Pollution Control Administration, and other interested parties to review the existing situation, the progress which has been made, to lay a basis for future action by all parties concerned, and to give the State, localities and industries an opportunity to take an indicated remedial action under State and local law.

The conference technique is rather an old one. It is used informally by many State agencies in the normal conduct of their business in the field of water pollution control. The conference system was proposed by the United States Supreme Court as long ago as 1921 in the famous case of New York versus New Jersey, involving interstate pollution. I would like to quote from this decision:

> "We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal by the large and growing population living on the shores of New York Bay is one more readily to be most wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court however constituted."

We strongly support the conference technique and we measure our success by the problems which are solved at the conference table rather than in court.

As specified in Section 10 of the Federal Water Pollution Control Act, the Secretary of the Interior has notified the official State water pollution control agency, which is the Massachusetts Water Resources Commission, of this conference. This conference is between the official State agency and the Federal Water Pollution Control Administration. The Massachusetts Water Resources Commission may bring whomever it wishes to the conference and have them participate in the conference. However, only the representatives of the official State agency and the Federal Water Pollution Control Administration constitute the conferees.

Opening Statement - Mr. Stein

The Commonwealth of Massachusetts has designated as its conferees for this conference Mr. Robert Yasi and Mr. Tom McMahon, who are both on my left. Mr. Lester Klashman of the Federal Water Pollution Control Administration Northeast Regional Office, with headquarters in Boston, Massachusetts, has been designated as conferee for the Federal Government.

My name is Murray Stein. I am from Washington, D.C., and am a representative of Secretary Stewart Udall.

Both the State and Federal governments have responsiblities in dealing with water pollution control problems. The Federal Water Pollution Control Act declares that the States have primary rights and responsibilities for taking action to abate and control pollution. Consistent with this, we are charged by law to encourage the States in these activities.

At the same time, the Secretary of the Interior is charged by law with specific responsibilities in the field of water pollution control in connection with pollution of interstate and navigable waters. The Federal Water Pollution Control Act provides that pollution of interstate or navigable waters, whether the matter causing or contributing to the pollution is discharged directly into such waters, or reaches such waters after discharge into a tributary, which endangers the health or welfare of any persons, shall be subject to abatement.

The October 1965 amendments to the Federal Water Pollution Control Act additionally empower the Secretary of the Interior to initiate enforcement procedures whenever he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution of interstate or navigable waters, and the action of Federal, State, or local authorities.

This conference on pollution of the navigable waters of Boston Harbor and its tributaries is the fourth to be held under these shellfish provisions of the Act. Of course, as the representatives of the shellfish industry and some others know, we have a tremendous case in Washington's Puget Sound involving discharges from paper mills and injury to the Pacific oyster industry, but that conference was called on the initiative of the Governor of Washington. The three earlier shellfish-provision conferences were all held on the East Coast -- the sites were Long Island, Maine and New Jersey. The experience we have gained from these three enforcement conferences and from the several other interstate and intrastate conferences held throughout the years has shown us that each area of concern presents its own unique features. Many pollutional causes and problems are shared in common from city to city but the particular local geographic and socio-economic factors of the area always form a good part of our consideration.

Today's conference will cover the effects on interstate commerce caused by pollution of the shellfish beds in Boston Harbor. We expect the conference will be useful in providing a clear picture of the problem, delineating the progress which has already been accomplished, and in indicating what needs to be done to correct the pollution problem in these navigable waters.

All the conferees will be called upon to make statements. The conferees, in addition, may call upon participants whom they have invited to the conference to make statements. At the conclusion of each statement, the conferees will be given an opportunity to comment or ask questions. This procedure has in the past proven effective in developing the facts and reaching equitable conclusions.

At the end of all the statements we will have a discussion among the conferees to try to arrive at a basis of agreement on the facts of the situation. Then we will attempt to summarize the conference orally, giving the conferees, of course, the right to amend or modify the summary.

Under the Federal law, the Secretary of the Interior is required at the conclusion of the conference to prepare a summary of it which will be sent to all the conferees. The summary, according to law, must include the following points:

1. Occurrence of pollution of navigable waters subject to abatement under the Federal Act;
2. Adequacy of measures taken toward abatement of pollution; and,
3. Nature of delays, if any, being encountered on the abatement of pollution.

The Secretary is also required to make recommendations for remedial action if such recommendations are indicated, and experience that we have had in the past indicates that whomever we have had as a Secretary -- and we have had many that have exercised their rights under this Act -- when the conferees have unanimously agreed on recommendations, the Secretary has enforced them.

A word about the procedure governing the record of the conference. A record and verbatim transcript of the conference is being made by Mr. Simpson. This is made for the purpose of aiding us in preparing a summary, and also providing a complete record of what is said here.

We will make copies of the summary and transcript available to the official water pollution control agency of Massachusetts.

We have found that, generally, it is best that people who wish transcripts should request them through their State agency rather than come directly to the Federal Government. The reason for this is that we would prefer people who are interested in the problem to follow their normal relations in dealing with the State agency rather than the Federal Government on these matters, when the conference has been concluded. This has worked successfully in the past and we will be most happy to make this material available to Massachusetts for distribution.

I would suggest that all speakers and participants other than the conferees making statements come to the lectern and identify themselves for purposes of the record. In addition to that I would suggest that if you have a written statement, you try to give copies of that to the reporter and to the conferees when you come up to make a statement.

One other word. We probably will not have the transcript available for distribution for about three or four months. That is about as long as it takes us to get this through the government printing process. The summary, of course, will be available much earlier. In addition to that you can expect that if you have any charts or maps, we will produce them in black and white. It would be more meaningful if in your discussion you do not refer to colors because anyone reading the transcript later on would not be able to relate the color referred to on a black and white map or chart.

The prognosis at the present time is that we would expect the conference to be concluded in one day. We are going to try to break a little before twelve; hopefully some time about quarter to twelve for lunch; and we will have about an hour and a half for lunch and continue this afternoon.

Our agenda is that we will have the Federal presentation first, and the State presentation will follow. We will adjust the agenda for congressional Representatives or for the Governor of Massachusetts.

Now first we would like to call on Donald Haider, who is representing Senator Edward Kennedy of Massachusetts.

Mr. Haider.

MR. YASI: Would you for the record simply note that we wish, before we hear the Federal presentation, to reserve our rights to discuss jurisdiction.

MR. HAIDER: Thank you. I want to welcome everyone here today on behalf of Senator Kennedy and to express to you his personal gratitude for attending this workshop. I regret that the Senator could not be with you, but he asked me as a member of his Washington staff, to give this speech in his absence.

STATEMENT OF THE HONORABLE EDWARD M. KENNEDY, UNITED STATES SENATOR, WASHINGTON, D.C.

READ BY DONALD HAIDER, LEGISLATIVE
ASSISTANT TO THE SENATOR

In October last year, I attended a Workshop on the Pollution of the Connecticut River. It was my feeling at the time that comprehensive water quality programs can be developed and implemented only through the coordinated participation of water users, pollution control authorities, construction agencies, Federal, State and local officials and other interested groups.

Legislation is not enough for regulation. Compliance and cooperation require constant surveillance, reporting and evaluation of progress. The Boston Harbor pollution problem requires all of this and more. We have nothing less than 11 agencies and councils on all government levels involved in the harbor's pollution abatement and therefore, this workshop and similar meetings are absolutely necessary in developing a planned strategy for meeting our goals.

The progress we make toward solving this problem has ramifications far beyond this city or even the Commonwealth. It has considerable relevance to our seaboards throughout the United States. Where we once defined the sprawling urban expansion in terms of "Megalopolis," we now think in terms of "Atlanticoplis." This view of the highly urbanized eastern coast with its cities extending from Boston to Richmond has elevated the problems of waste removal and water pollution to the same scale as that of land use, air and food supply and transportation networks.

It is disheartening, indeed, to chronicle the events leading to the decline of Boston Harbor both as a commercial and a recreational center. The destruction of shellfish beds and decrease in their production, the decline of sport fishing, the closing of beaches to bathing, and the conspicuous discoloration of the harbor's waters are just a few of the effects brought about by rampant pollution. Not only does this condition tarnish the renaissance of Greater Boston, but it constitutes a harmful alteration of our environment. The uncontrol of waste products in our community has menaced the very world we live in, our enjoyment and our health. We are constantly reminded that polluted water is wasted water.

On reading the Pollution Report on Boston Harbor prepared by the Federal Water Pollution Control Administration, one gets the discouraging impression that our Founding Fathers set more than a revolution in motion by dumping tea into the harbor. It seems they set a precedent. In sum, the harbor has become a reservoir for the dumping of pollutants -- a situation which can no longer be tolerated.

Though I am disheartened by the past history of our negligence and lack of concern over the harbor's condition, I have every reason to be optimistic about the future.

First, in the last few years, Congress has demonstrated an enormous concern to help regions, States, cities and towns to meet the pollution problem. The Water Quality Act of 1965, the Clean Water Restoration Act of 1966, the Federal Water Pollution Control Act and Amendments, the HUD Water and Sewer Program -- all of these responses of the Congress indicate the pressing need to get the job done.

I might add that Senator Kennedy has sponsored and/or co-sponsored most of these programs.

For the most part these programs have been well structured with ample incentives to encourage cooperation among Government levels.

Secondly, I am tremendously impressed by the caliber of personnel working on this problem. No more dedicated individuals can be found than Murray Stein, Lester Klashman, Herb Pahren and their numerous State and local counterparts. I am hopeful that under the leadership of these men that we will successfully solve the problem at hand. Furthermore, Governor Volpe, Mayor White and the New England Regional Commission have endowed this Boston Harbor project with highest priority.

Thirdly, I have great faith that Boston Harbor can once again become a major recreational center for the Boston area. If and when we solve this pollution problem, recreational development will most assuredly follow. I am informed the Metropolitan Area Planning Council already has developed recreational plans for the harbor, including substantial increases in bathing and sport fishing areas as well as the establishment of additional boating facilities.

Fourthly, I am ultimately hoepful that recreational development is not incompatible with commercial development. The immediate task of reducing pollution can be carried on simultaneously with programs aimed at restructuring the port. As a matter of fact, the replacement of dilapidated piers and wharves with new facilities would compliment the entire abatement program. The Port of Boston -- the largest seaport in New England -- desparately needs revitalization, and this revitalization can be viewed in the context of the pollution crisis.

Fifthly, I am tremendously encouraged by the recommendations made by the Federal Water Pollution Control Administration and fully intend to do all that is possible to see they are adopted and implemented. It is interesting to note that some progress has been accomplished already. Since the calling of this workshop, the Deer Island sewerage treatment facility has been placed into operation - one of the major recommendations made in this report.

Finally, let me leave you with the offer to help. If my office can be of assistance to this Council or communities making grant applications for sewerage facilities, please do not hesitate to contact me.

I fully intend to keep abreast of this situation and the progress being made in implementing the recommendations offered here today. I have informed Mr. Stein and Mr. Pahren that I shall be in Boston early this June to obtain a briefing on future plans and progress made in this area.

Let me again express my appreciation for your attendance at this conference. I have great confidence that this workshop will develop useful, constructive and creative ideas as to what can be done to provide additional encouragement to those involved in the challenge ahead.

CHAIRMAN STEIN: Thank you, Mr. Haider. Any comments or questions?

(No response.)

CHAIRMAN STEIN: Thank you for an excellent statement. Senator Kennedy has always been very helpful in this national water pollution control picture, and particularly water pollution control problems in Massachusetts and the New England area. He is one of the most active Senators in this field, and he has had a very complete and direct interest in our program. We appreciate that contribution.

We will now have the Federal presentation. Mr. Klashman?

MR. KLASHMAN: Before starting the Federal presentation, I would like to ask that if anybody plans to make a statement today and has a prepared statement but without copies and wants to provide us with some, if you will just loan your copy to Mrs. Lando who is sitting at the desk back there, we have a Xerox machine and will reproduce them. It will be most helpful for our conferees and it would also be helpful to the press.

Our first presentation will be given by Mr. Walter Newman, who is chief of the Northeast Water Quality Management Center at Needham, Massachusetts, Federal Water Pollution Control Administration.

CHAIRMAN STEIN: While Mr. Newman is coming up, let me make clear one procedural point. This is a conference, and there will not have to be objections made to preserve any procedural rights and substantive rights. These can be raised at any time. We try to keep the procedure as flexible as we can in order to get continuity.

STATEMENT OF WALTER M. NEWMAN, DIRECTOR,
NORTHEAST WATER QUALITY MANAGEMENT CENTER,
U. S. DEPARTMENT OF THE INTERIOR, FEDERAL
WATER POLLUTION CONTROL ADMINISTRATION,
NEEDHAM, MASSACHUSETTS

MR. NEWMAN: Mr. Chairman and Conferees, I am Walter M. Newman, Director of the Northeast Water Quality Management Center at Needham, Massachusetts. We will not present all of the report, but I would like the entire report entered into the record as if read.

CHAIRMAN STEIN: Without objection this will be done.

MR. NEWMAN:

INTRODUCTION

BACKGROUND

As a result of pollution of the waters overlying the shellfish growing areas in Boston Harbor, the Commonwealth of Massachusetts has issued orders prohibiting or otherwise restricting the harvesting of shellfish for human consumption in certain areas in order to protect

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the public health and welfare. These restrictions are summarized as follows:

An order was issued on February 13, 1937, which restricted harvesting of shellfish from the Slate Island area of Hingham and Weymouth indicating they must receive appropriate treatment prior to consumption. On May 5, 1941, shellfishing was prohibited in Boston Harbor except for designated areas. As a result,

a. Shellfishing is prohibited in approximately 1,560 acres;

b. Shellfishing is restricted in approximately 2,432 acres; and,

c. Shellfishing is unrestricted in approximately 500 acres.

On June 1, 1967, shellfishing was prohibited in the Old Harbor area. This was the first closure since 1941.

The latest order was issued on April 1, 1968. Since June 1, 1967, 1,113 additional acres have been prohibited. As a result,

a. Shellfishing is prohibited in approximately 2,673 acres;

b. Shellfishing is restricted in approximately 1,319 acres, and,

c. Shellfishing is unrestricted in approximately 500 acres.

The only unrestricted or open areas are located along the southern shores of the harbor. These areas are under observation by the Massachusetts Department of Public Health to determine whether or not they should also be restricted.

As provided in the Federal Water Pollution Control Act, as amended, "The Secretary shall also call such conference whenever, on the basis of reports, surveys, or studies,...he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of Pollution...""...and action of Federal, State, or local authorities."

The Secretary of the Interior has called a conference of the navigable waters of Boston Harbor.

Numerous personnel from the following agencies assisted in the collection of data or report preparation. They include the United States Department of Health, Education, and Welfare, Public Health Service; United States Army, Corps of Engineers; Massachusetts Department of Public Health, Division of Sanitary Engineering; Massachusetts Department of Natural Resources, Division of Marine Fisheries, and Division of Water Pollution Control; Massachusetts Department of Commerce, Metropolitan Area Planning Council, Boston; and Metropolitan District Commission, Sewerage Division. The cooperation of all of these agencies is gratefully acknowledged.

DESCRIPTION OF AREA

The area, as defined by the Massachusetts Department of Public Health for shellfishing purposes, is "...the waters and flats of Boston Harbor, including all its arms and tributaries, west of a line drawn from Windmill Point in Hull to the southeasterly point of Deer Island to Point Shirley and including the shores of Lovells, Gallops and Georges Islands..." as shown on the slide. These areas have been defined and established as shellfish grounds as far back as 1937 and have been periodically reevaluated. This area, known as Boston Harbor, includes Boston Inner Harbor, Boston Outer Harbor, Winthrop Harbor, Dorchester Bay, Quincy Bay, Hingham Bay and Hull Bay. It has a surface area of approximately 24 square miles.

Boston Harbor receives the drainage, including waste discharges, from four major coastal streams -- the Mystic, Charles, Neponset and Weymouth Fore Rivers; the entire waterfront and minor tributary areas extending from Winthrop to Hull; and all of the municipalities which are part of the Metropolitan District Commission sewerage system. This area, containing 664 square miles and supporting a population of approximately 2,000,000 lies completely within the Commonwealth of Massachusetts. It contains 48 cities and towns in their entirety and significant portions of eleven others.

POPULATION AND ECONOMY

In 1965 the total population of the Boston Standard Metropolitan Statistical Area (SMSA) was 2,600,000, one-half of the State population and one-quarter of the population of New England. Although the core city of Boston declined in population from 725,000 in 1955 to 620,000 in 1965, the population of the Standard Metropolitan Statistical Area increased approximately 6.1 percent. The population of Massachusetts had a slightly higher percent increase in the same period, approximately 7.4 percent. Within New England, the Boston area's role as the cultural, commercial, industrial and financial leader is unchallenged.

Employment in the area is growing at a slightly faster rate than in the State as a whole. Total employment in Massachusetts advanced 9.5 percent between 1950 and 1960, while employment in the Boston metropolitan area increased 12 percent.

Compared to the rest of the State the employment pattern in this area is centered somewhat less on manufacturing and more on service industries, particularly insurance, education, medical services and government. Of those employed in the State, 53 percent and 35 percent are engaged in service and manufacturing activities, respectively.

In the Boston Standard Metropolitan Statistical Area, 63 percent and 29 percent of those employed are engaged in service and manufacturing activities. Manufacturing employment is concentrated mainly in electrical machinery, apparel, food and kindred products.

The Port of Boston, with an annual total volume of over 20 million short tons of cargo, is the largest seaport in New England, both in its extent of waterfront facilities and in its volume of waterborne trade. Boston ranks as the fourth largest seaport in the North Atlantic area after New York, Baltimore and Philadephia. In the last decade, the Port of Boston has increased in cargo and passenger transport, but its growth has lagged in relation to other North Atlantic ports.

HYDROGRAPHY

Boston Harbor, which opens to Massachusetts Bay, is approximately 24 square miles in area. More than three-quarters of the harbor has a mean low water depth of 10 feet or less. Two major shipping channels serve Boston Harbor: President Roads, with a mean low water depth of 40 feet, and Nantasket Roads, with a mean low water depth of 30 feet. There are approximately one and one half miles of effective harbor connections with Massachusetts Bay.

The maximum current velocity in the main channel is two knots, occurring near Deer Island Light three hours after the beginning of flood tide. In terms of flow and circulation, the harbor may be divided into two sections. The northern section is comprised of Presidents Roads, Dorchester Bay and Inner Harbor; the southern section is comprised of Quincy Bay, Hingham Bay and Hull Bay. In both sections the tidal fluctuation is approximately nine and a half feet.

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On a volume-flow relationship the residence time is slightly under two complete tidal cycles -- approximately 24 hours. However, the harbor is not completely flushed out every 24 hours, for there are many sections where backwaters and poor circulation result in much greater residence times.

The total flow from the tributary streams ranges from 20 cubic feet per second to 1,800 cubic feet per second, averaging 350 cubic feet per second during the summer. This flow is very low compared to the daily inflow of salt water, which averages 320,000 cubic feet per second for a six-hour period.

The annual precipitation for the area averages 43 inches. Approximately 65 percent of this precipitation occurs in the winter and spring.

SOURCES OF POLLUTION

Boston Harbor receives the discharge of municipal wastes from 1.5 million people served by the Metropolitan District Commission sewerage system and municipal wastes from parts of Hull and Boston. Degradation of water quality in the harbor also results from industrial waste discharges, combined sewer overflows, streams tributary to the harbor, Federal facilities discharges, watercraft wastes, debris and refuse contributed by barging operations, shoreline refuse dumping and dilapidated piers and wharves and other sources.

MUNICIPAL WASTES

The greatest source of pollution to the waters of Boston Harbor is the discharge of municipal wastes. Approximately 460 million gallons per day of raw or partially treated sewage from the Boston metropolitan area are discharged through two major sewerage systems operated by the Metropolitan District Commission.

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The South Metropolitan system serves 22 cities and towns and transports the waste to the Nut Island sewage treatment plant. At Nut Island, primary treatment (except for sludge disposal) with seasonal chlorination is afforded before discharge. The average volume of sewage entering the Nut Island facility is 110 million gallons per day. Approximately 30 percent of the oxygen demanding material is removed through treatment. The treated sewage is discharged through two five-foot diameter outfalls as shown in Figure 2. One outfall, at a depth of 30 feet, extends 6,000 feet from the plant; the second outfall extends 1,400 feet from the plant at a depth of 20 feet. Digested sludge is discharged through a 12-inch, 4.2 mile pipe in the President Roads area. This discharge of sludge greatly reduces the overall effectiveness of the treatment plant in terms of bacteria, oxygen demanding material, nitrogen and phosphorus removed.

Twenty metropolitan communities contribute wastes to the North Metropolitan system. Approximately 350 million gallons per day of sewage from this system is conveyed to Deer Island, the site of a new primary treatment plant which we understand has just become operational. The plant is designed to provide primary treatment (except for sludge disposal) or approximately 30 percent removal of the oxygen demanding material. Digest sludge and seasonally chlorinated effluent will be discharged to the harbor. The discharge of this sludge will greatly reduce the overall treatment effectiveness. Currently we understand that temporarily no sludge is being discharged with a resulting removal of approximately 40 percent.

Sewage treated in a properly designed and operated primary treatment facility is capable of removing 30 to 35 percent of the oxygen

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demanding materials. However, unless the nutrients present in waste discharges are also removed, phytoplankton activity such as that occuring in Boston Harbor will produce oxygen depletions that will continue to endanger the aquatic life of the harbor. Adequate secondary treatment of sewage can reduce the nutrient content of the waste discharge and is capable of removing from 85 to 95 percent of the organic matter and greatly reducing the coliform bacteria. Disposal of the digested sludge into the receiving waters increases the amount of nutrients and oxygen demanding material in those waters and reduces the overall efficiency of primary or secondary treatment facilities.

The Federal Government has not granted funds to the Metropolitan District Commission for construction of the Deer Island sewage treatment facility because of the MDC method used for the discharge of sludge.

In addition to the above major sources of municipal waste, untreated sewage is still discharged at the city of Boston's Moon Island facility. In the Town of Hull, untreated sewage is discharged at three locations within the harbor.

INDUSTRIAL WASTES

The majority of the industries in the Boston area discharge to municiapl sewerage systems. Complete listings of sources of industrial waste discharging directly to the waters of Boston Harbor are not available. Partial listings are in various stages of development by Federal, State and local agencies.

COMBINED SEWER OVERFLOWS

Portions of many of the cities and towns in the Boston Harbor drainage basin have combined sewer systems. During periods of heavy rainfall, when major interceptors reach their capacity, the local sewers overflow directly into the harbor and tributary streams. In some instances this overflow occurs during normal dry weather flow. There are more than 200 points of sewer relief in the Boston area which produce a significant bacterial, grease, solids and organic load in wet weather. Over 90 of the overflows discharge directly into the harbor.

TRIBUTARY STREAMS

The Chelsea, Mystic, Charles, Neponset and Weymouth Fore Rivers are severely degraded as they enter Boston Harbor. The Charles, Neponset and Mystic Rivers are the greatest contributors. Combined sewer overflows constitute a major source of pollution to the tributaries. Significant amounts of oil are added to the harbor from the Chelsea, Mystic and Weymouth Fore Rivers. These streams are major commercial waterways with many tank farms located along their shores.

FEDERAL INSTALLATIONS

Executive Order 11288 requires heads of Federal departments, agencies and establishments to provide leadership in the national effort to improve water quality through the prevention, control and abatement of water pollution from Federal activities in the United States. The Order requires that the Secretary of the Interior provide the necessary review, coordination and technical advice for all Federal departments, agencies and establishments. These, in turn, are required to cooperate with the Secretary, State and interstate agencies and municipalities insofar as practicable and consistent with the interests of the United States and within available appropriations. Water pollution control requirements must be considered and included in the initial stages of planning for each new Federal installation or project. Phased and orderly plans for installing water pollution abatement facilities at existing installations must be developed and periodically revised as required. The Secretary of the Interior has assigned the responsibility of implementing the Executive Order to the Federal Water Pollution Control Administration.

The Federal installations in the Boston Harbor area are listed in the Report. Also included in this table are the present sanitary and industrial waste flows and their disposition at each installation. A brief description of the waste disposal practices of the major sources of sanitary and industrial wastes from Federal installations follows:

Boston Naval Shipyard

All sanitary wastes from the Boston Naval Shipyard, Charlestown, shore facility, which average flow is approximately three-tenths of a million gallons a day, are discharged to the Boston City Sanitary Sewer System. Cooling water approximating about 1.4 million gallons a day is discharged to Boston Harbor. Approximately 770 gallons per day of wastes from machine shop and tank cleaning operations are discharged directly to the Harbor. This discharge of industrial wastes is not in conformance with the requirements of Executive Order 11288 and corrective action is recommended.

South Boston Naval Annex

All sanitary wastes from the shore facility, with an average flow of about 9,000 gallons per day, are discharged to the Boston City sanitary sewer system. Cooling water, with an average flow of approximately 0.3 mgd is discharged through the Boston City storm drains to Boston Harbor.

Navy Ships Berthed in Boston Harbor

The sanitary wastes from all Naval ships berthed in the harbor are discharged without treatment. The total flow discharged varies with the sizes and numbers of ships in port but is estimated to average 40,500 gallons per day. The Navy is engaged in a program to abate pollution from its vessels, and as part of this program has installed a treatment device on board a destroyer based in Boston. This device is currently undergoing testing and evaluation. Corrective action is recommended to eliminate pollution by Naval vessels.

Coast Guard's Base Boston

Sanitary wastes from two urinals located on one of the piers, all sanitary wastes from Coast Guard ships berthed at Base Boston and cooling water from the Base are discharged directly into the harbor. All other sanitary wastes from the facility are discharged to the Boston sewer system.

Plans for the removal of the urinals and for a sewer to collect sanitary wastes from berthed ships with discharge to the Boston sewer system are nearing completion. The project is scheduled for completion in late 1969 or early 1970.

CHAIRMAN STEIN: Mr. Newman, may we interrupt for a moment, please? We have another presentation that we'd like to make now.

MR. YASI: It was impossible for His Excellency to be here this morning, but I'm sure you will all agree that with Lieutenant Governor Francis W. Sargent he has sent us his first string, and also all of you know that he has been extremely well acquainted with the subject matter of this morning's conference, and he has a bit of a program bind himself.

I present to you with pleasure Lieutenant Governor Francis W. Sargent.

HONORABLE FRANCIS W. SARGENT, LT. GOVERNOR,
COMMONWEALTH OF MASSACHUSETTS, BOSTON,
MASSACHUSETTS

LT. GOVERNOR SARGENT: Thank you very much, Commissioner Yasi, Mr. Stein, members of the conference, and my apologies to you, sir, for this interruption. I appreciate it very much. My remarks will be very brief and I hope they make sense, however. I apologize also for the fact that Governor Volpe can't be here this morning; so this morning you are going to have to make do with number two.

Mr. Chairman, it's my pleasure today to represent the Commonwealth of Massachusetts and Governor Volpe in conference we hope will speed the cleanup of Boston Harbor and permit maximum shellfish, recreational, commercial and other water uses of the harbor for the people of Boston and the metropolitan area.

Despite real progress under the Massachusetts Clean Waters Act over the past 17 months, water pollution remains a critical social problem here in Massachusetts as well as everywhere else.

In 1966 Massachusetts enacted one of the Nation's most comprehensive water pollution control programs. We established a new Division of Water Pollution Control in the Department of Natural Resources under the Massachusetts Water Resources Commission. We set up a $150 million bond issue to aid local construction of waste treatment facilities, and we provide for tax inducements for industries constructing their own treatment works.

After Federal grant fund cutbacks last year we sponsored legislation creating a system that allowed the Commonwealth to advance the Federal cost of eligible projects to communities in anticipation of future Federal reimbursements. A further aid was a system of advancing seven percent of the estimated construction costs of community projects to permit drafting of final plans and specifications.

The State has made grant offers to 11 communities so far this year involving a total construction cost of about $13 million. By the end of this fiscal year there will be about $20 million worth of waste treatment works construction right here in Massachusetts.

We wish the Boston Harbor situation were as bright. We acknowledge difficulty and delay in making the Metropolitan District Commission Deer Island treatment plant operational. Now that it is finally at long last working, we look forward to significant benefits from increased water quality.

But the Boston Harbor problem is as complex as it is formidable, and waste treatment is only one part of it. We face equally difficult problems of floating debris, rotting piers and piling, oil pollution, commercial, military and pleasure boat pollution, storm runoff, and enormous technical and economic problems involved in combined sewer discharges involving several communities, districts, industries and governmental agencies at all levels.

Later this morning details will be offered for a deep-tunnel plan developed for the city of Boston that promises alleviation of many of the problems facing the harbor. It has a half-billion dollar price tag, and most of the work would not be eligible for State or Federal aid under the existing law.

Despite these obstacles Massachusetts does not propose to turn its back on Boston Harbor and its myriad problems. Such problems yield only to confrontation and direct action.

In that spirit Governor Volpe has authorized me to announce today that he has directed a full-scale evaluation of the problems of Boston Harbor. Commissioner of Natural Resources Robert L. Yasi will head the investigating committee and will report and make recommendations by January 1, 1969. As Chairman of the Massachusetts Water Resources Commission, Commissioner Yasi is uniquely qualified for this assignment. The Committee will include representatives of all the State agencies--agencies of the Commonwealth that are customarily involved in this type of problem: Department of Public Health, Department of Public Works, Department of Natural Resources and so on--as well as the Federal Water Pollution Control Administration, the MDC, the city of Boston, the Boston Port Authority and whatever other agencies or jurisdictions the Chairman deems appropriate and necessary.

The scope of the evaluation will include, but not be limited to:

1. A status report of pollution abatement required by the Division of Water Pollution Control for all municipal and industrial contributors listed in the Massachusetts Standards of Water Quality.
2. A report of the attainment of Boston Harbor water classifications by the several municipal and industrial pollution sources.
3. Delineation of an overall plan to control the dumping of garbage or refuse along the shores and in the harbor.
4. A program to improve dump sites and correct the

problem of sunken vessels, deteriorating piers and debris.

5. Investigation of suitable Federal and State laws to control oil pollution and wastes from watercraft.
6. Study of the deep-tunnel proposal from a water quality and use standpoint as well as consideration of the most feasible means of financing such a project.
7. Plans to assist Federal authorities in the implementation of treatment works from Federal installations.

I conclude by complimenting those taking part in this conference and those who are attending it out of concern for the future of one of the finest harbors not only in the Nation but in the world.

I have long warned that we are making a tragic mistake in turning our back on the sea in Massachusetts and in particular turning away from Boston Harbor. We should be doing precisely the opposite-- turning toward the sea, toward the harbor, and realizing that by insuring its future we enhance a natural bounty that will pay us richly in commercial and industrial growth as well as recreational opportunities for this great metropolitan area and for the Commonwealth as a whole.

Few conferences that are going to be held in Boston this year are going to be as important as this one, if we can at long last move forward in changing Boston Harbor in terms of making Boston Harbor what it can be and what it should be, so that no longer we are turning our back on one of the greatest assets that we have in the New England area.

Thank you very much. (Applause)

CHAIRMAN STEIN: Thank you very much for a very constructive statement, Governor Sargent. There are two particular points I get from your statement that are really excellent. One is that we really have a complex problem in Boston Harbor that is not to be minimized and I think it's going to take all our efforts--Federal, State and local--working together. We have to work together to just meet the problem.

And the other theme you have is a theme I've been using for a long time, and that is concerning people turning their backs on places with a unique resource like Boston Harbor. Before you came in, Mr. Newman pointed out that while the Port of Boston has grown, it has not grown as much as some of the other ports. Now, we had the same situation in a lot of towns along the Missouri River, for example, Sioux City--and they said the same thing. They had turned their backs on the Missouri as if it never existed, and they stayed rather static since about the 1920's. When they cleaned up the pollution problem that is not the only thing they did. They cleaned up the approaches to the city and some of those stockyards, built decent highways coming in and the entire character of the city changed. New industry started coming in and they began to grow again. I think we stand with you not only as to Boston Harbor's being a vital resource for Boston and the people of Massachusetts, but I think it is in our national heritage as one of the most priceless things we have. If anyone from outside your area such as a fellow like me thinks of Boston, what does he think of - Boston and the sea and the harbor. That is the first thing that comes to mind, and I couldn't agree with you, more, sir. This has been very, very encouraging from our point of view. Thank you very much.

LT. GOVERNOR SARGENT: Thank you, Mr. Stein. As a matter of fact, you point out something that I think perhaps should be mentioned. That is that for a number of years there were proposals for the redevelopment of Boston's waterfront, but they were consistently opposed - frankly by State agencies. I have had the opportunity as Commissioner of Public Works to turn that department around so that we would, rather than be opposing the development of the Boston waterfront and rebuilding the Boston waterfront, instead we would be favoring it. It seems to me that the possibilities that one can see beginning to emerge with the new New England aquarium and the new construction that is going forward along the waterfront, that certainly we have got to see to it that we are cleaning up the pollution that is there, the decaying that is there and the unfortunate situation that has developed there over the years.

It can be done. It's got to be done, not solely by the city, not solely by the State agencies, but by a unified effort of all agencies working together.

Thank you very much.

CHAIRMAN STEIN: Thank you, sir.

MR. McMAHON: At this time I would like to introduce Representative Ralph Sirianni from Winthrop who has a statement.

HONORABLE RALPH E. SIRIANNI, HOUSE OF REPRESENTATIVES, COMMONWEALTH OF MASSACHUSETTS, BOSTON, MASSACHUSETTS

Honorable Ralph E. Sirianni

MR. SIRIANNI: Mr. Chairman, Commissioner Yasi, let me thank you for this opportunity to express to you and the Federal Government my sentiments.

I know many words will be said here today, but I think we should concern ourselves with the facts not historically but for the future. I suppose, however, I should mention the past to inform our grandparent, the Federal Government, that Massachusetts has spent over $160 million within the past 20 years, not because we were forced to by the Federal Water Pollution Control Act, but because Massachusetts recognized that water pollution would become a very serious problem.

Last week I was privileged to tour the MDC sewage treatment plant at Deer Island. As you may be aware, I was one of the legislators responsible for the joint legislative committee to investigate the continued delays of this facility. I would like to publicly announce here today that with the exception of minor problems this facility will be responsible for cleaning up a large portion of sewage that was creating a real serious problem.

I suppose, representing a district like Winthrop, surrounded by water, I am more aware and conscious of the fact that our harbor has been grossly polluted for many years. In fact, eight years ago in 1960. when at that time I was the health officer for the Town of Winthrop, I was forced to close all the beaches on the Inner Harbor prohibiting bathing. The bacteria count was far in excess of the State health standards. This restriction still stands today. Having lived with this pollution problem for eight years you can imagine my delight that the treatment plant was now in operation. However, this ecstasy was short lived when I discovered that some 90 emergency overflows that are a part of the city of Boston sewage system are so antiquated, dilapitated and in disrepair. In one such location, within an eighth of a mile of Constitution Beach at Orient Heights, East Boston, an estimated 500,000 gallons of raw sewage is being sucked out of the system and could prevent the opening of the beaches in Winthrop this year. I have been informed that the city of Boston is aware of this serious situation and has been for many years; and only recently a study has been done to evaluate cost, etc.

I was amazed, if not downright disappointed, when I read the notice sent by the Water Resources Commission, dated May 9, and I read in part, "This conference has been called by Secretary Udall of the Department of the Interior under Section 10(D)(1) of the Federal Water Pollution Control Act upon his finding that substantial economic injury results from the inability to market shellfish and shellfish products in interstate commerce because of pollution of the navigable waters of Boston Harbor and its tributaries."

Mr. Chairman, as I said at the outset, let's deal with the facts. I surely will not minimize the necessity to investigate the economic injury resulting in the inability to market shellfish or shellfish products. However, it would appear to me that the health and well-being of the people living near these grossly polluted rivers, streams, lakes and ocean shorelines, who are being subjected to inhale foul odors, whose homes have been damaged as a result of hydrogen sulfide gases eminating from grossly polluted mud flats, citizens who are denied the right to use recreational facilities as the result of infectious fecal materials on beaches - it seems to me that this would be the primary factor and motivating force to eliminate pollution.

Being in politics I am well aware of how easy it is to be critical. Perhaps I should clarify my statements at this point. I certainly am not critical of Secretary Udall or his Department of the Interior; but it seems to me we are approaching this problem from the back door. I would think that the Congress should be made aware of the serious health menace the people are being subjected to as well as the economic factor.

Mr. Chairman, I would hope that the Federal Government would allocate more money toward subsidizing not only the building of new sewage facilities, but the remodeling, renovating and repair of older systems. Please let's not spend money on studies to tell us we have a serious pollution problem. This we are already aware of.

CHAIRMAN STEIN: Thank you, Representative Sirianni, for a really excellent statement. This is one of those precise statements pointing out specific matters which is going to be very, very helpful.

Now I would like to point out that our purpose is to come up with an action program and, hopefully, not another one of these study programs. There is one point I would like to make to you in explanation. I would not say that Secretary Udall and the staff of the Department of the Interior do not agree with your analysis of what are the important features of the Act. However, under the Federal law the Secretary of the Interior can only come into a case of this type under the shellfish provisions. The only other case where we can come in on our own initiative is one in which pollution in one State endangers the health or welfare of persons in another State. As has been pointed out, the area here -- Boston Harbor -- is solely within the confines of the Commonwealth of Massachusetts. The only way we could come into an intrastate case of this type under the present law and hit all aspects of pollution would be at the request of the Governor. As I pointed out in my opening statement,we have had a request like that from the Governor of the State of Washington. But in the absence of that, the only way we can come in is under the provision for the protection of shellfish.

One further point: The requirements of the health authority for shellfish harvesting are among the top requirements of any water use in the country for almost any use. If water meets those requirements you can be sure that the conditions you complain of will not exist.

MR. SIRIANNI: Thank you, Mr. Chairman. That is why I tried to clarify my statement and not be critical of the Secretary. I would have had a much longer report, but the last time I made a statement at a Federal conference such as this, I had an eight-minute preparation, and I was cut off at four minutes; so I made it a four-minute preparation today. Thank you, sir.

CHAIRMAN STEIN: We are grateful for that. Let me point out we are not going to cut you or anyone else off.

Mr. Newman?

MR. NEWMAN: We were discussing the Federal installations pollution sources into Boston Harbor. The last one of these is the Nike Ajax site B-36 in Hull.

Approximately 6,000 gallons per day of sanitary wastes are passed through a septic tank and chlorinated before discharge to the harbor. This is not in conformance with Executive Order 11288. Secondary treatment is recommended.

WATERCRAFT WASTES

Sewage from almost all vessels using Boston Harbor is discharged without treatment; these watercraft contribute to the pollution problem. Recreational boating activity is centered in waters also used for bathing and recreational fishing. As boating use in the harbor increases, greater pollution will result, unless steps are taken to prevent raw sewage discharges.

Approximately 80 percent of the cargo transported through the port of Boston are petroleum products. The discharge of oil and oil materials from watercraft is a serious pollution problem, whether it is an accidental spill or oily wastewaters from ballast tanks, bilges or washing operations. Boston Harbor had a total of 29 oil spills reported in 1966 and 1967

DEBRIS AND REFUSE

Floating debris and refuse are esthetically unpleasant and a danger to shipping; they can also be a source of organic waste. The major cause of the debris problem in the harbor is dilapidated piers and wharves. Refuse dumped along the shore, litter contributed by vessels and garbage spilled during barging and burning operations are the main sources of solid waste.

OTHER SOURCES

Water quality may be adversely affected by a variety of other land and water activities. For instance, urban runoff from streets and parking lots can add significant amounts of organic and suspended materials. The disturbance of bottom muds by dredging operations can result in a resuspension of accumulated organic sludges and silt and the smothering of shellfish.

The city of Boston sewerage system was constructed in the late 1800's. From past experience in large cities it is likely that some local sewers, for which there are no records, have never been intercepted and are presently discharging sewage directly to the harbor and tributaries.

Mr. Chairman, I would like now to have Mr. Donald Smith, Chief of Planning and Evaluating Unit at the Northeast Water Quality Management Center, present the effects of pollution on water uses.

DONALD R. SMITH, CHIEF, PLANNING AND EVALUATING UNIT, NORTHEAST WATER QUALITY MANAGEMENT CENTER, U. S. DEPARTMENT OF THE INTERIOR, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, NEEDHAM, MASSACHUSETTS

MR. SMITH: Mr. Chairman and Conferees, I am Donald R. Smith, Chief of the Planning and Evaluating Unit of the Northeast Water Quality Management Center, Needham, Massachusetts. I will present the section of the report on:

EFFECTS OF POLLUTION ON WATER USES

SHELLFISH HARVESTING

Records at the Massachusetts Department of Natural Resources, Division of Marine Fisheries, disclosed that the commercial shellfish production from Boston Harbor and certain other areas has played a small but significant role in the economy of the shellfish industry in the Bay State. For the purpose of this report the shellfish production is confined to the harvesting and preparation for marketing of the soft-shelled clam (Mya arenaria) available in the intertidal waters of Boston Harbor. As a result of pollution of the growing areas, most of the shellfish harvested commercially in Boston Harbor may be marketed for human consumption only after an effective method of treatment has been applied.

Official Control of Shellfish Harvesting. Commercial and private harvesting of shellfish in Boston Harbor is controlled by two means -- the classification of shellfish beds by Massachusetts in order to protect the public health, and the issuance of permits by the towns to individuals for either commercial or sport digging of shellfish.

The shellfish harvest areas are defined by the State Department of Public Health as the waters and flats of Boston Harbor, including all its arms and tributaries inside of a line drawn from Windmill point in Hull to the southeasterly point of Deer Island and through Deer Island to Point Shirley and including the shores of Lovell, Gallops and Georges Islands. These areas have been defined and established as shellfish grounds as far back as 1937 and have continuously been redefined and surveyed. Table 3 of the Report lists the shellfish areas in Boston Harbor.

The commercial harvesting of shellfish is based on the quality of the overlying waters in the shellfish beds. Under the law the Massachusetts Department of Public Health is held responsible for the classification of all shellfish beds through a series of sanitary and bacteriological surveys. As a cooperating member of the National Shellfish

Sanitation Program for interstate shipment of shellfish, the State must also abide by Federal regulations. The coastal waters of Massachusetts, therefore, are divided into distinct bacteriological classifications in accordance with the Shellfish Sanitation Manual requirements of the National Shellfish Sanitation Program. This program is a cooperative partnership between the State, other cooperating member States, the shellfish industry, and the United States Public Health Service. In general the overlying waters of the shellfish beds are delineated under the following three bacterial classifications:

1. Approved areas: waters with a coliform median (most probable number) not to exceed 70 per 100 milliliters. Shellfish may be harvested and sold from approved areas for direct marketing.
2. Restricted areas: waters with a coliform median (most probable number) not to exceed 700 per 100 milliliters. Shellfish may be harvested but must be treated in a State-approved depuration plant before being sold.
3. Prohibited areas: waters with a coliform median (most probable number) that is greater than 700 per 100 milliliters. Shellfish may not be harvested for human consumption.

A complete statement of the classification requirements is given in Appendix A of the Report. As a result of potential contamination from sewage treatment plant effluents, certain approved areas beyond the outfall may be classified as "conditional;" that is, shellfish may be harvested and sold, provided that certain specified conditions concerning the potential pollution source and other factors are met. Seasonal closures are limitations applied to specific growing areas as a result of seasonal activities such as recreational boating, shipping and seasonal chlorination practices.

There are 4,492 acres of available shellfish growing beds in Boston Harbor. In 1941 all of these beds were closed and shellfishing was prohibited with the exception of 33 areas covering 2,932 acres. Twenty-nine were classified as restricted; four located in Quincy, Hull and Hingham were open. On June 1, 1967, shellfish beds in the Old Harbor area were reclassified as prohibited. Subsequently, 11 other sections including three partial closures were similarly classified. As of April 1, 1968, there were the original closure areas covering 1,560 acres; 12 prohibited areas covering 1,113 acres; 17 restricted areas covering 1,319 acres; and four approved areas covering 500 acres. The Massachusetts Department of Public Health is currently studying the water quality over the four approved areas. Preliminary indications are that these beds are marginal.

Massachusetts law requires that all commercial shellfish harvesters register with the Department of Natural Resources, Division of Marine Fisheries, for the privilege of taking shellfish for marketing. Two types of annual permits issued for harvesting in the shellfish areas of Boston Harbor are of particular interest. One type of permit is conferred to "Master Diggers." Each master digger must meet the requirements of the permit and post a $500 bond. Another permit is called a "Subordinate Digger's" license which subject to regulations provides that the digger may labor only under the employ and supervision of a licensed master digger. All shellfish obtained from restricted areas, as required by law, must be properly cleansed at a State-supervised depuration plant before being released for direct marketing to the consumer. To insure the safety of the product, the State has made available to the master diggers a shellfish treatment plant located 35 miles north of Boston in Newburyport, Massachusetts. This plant is maintained and operated by the Division of Marine Fisheries. The cost of treating the shellfish is shared by the master diggers and the cities and towns from which the shellfish are obtained.

In an ordinary year about 20 master and 180 subordinate digger permits are issued by the Division of Marine Fisheries for the harvesting of shellfish in Boston Harbor and in other areas along the northern Massachusetts coast. Table 4 of the report lists the number of permits issued to master and subordinate diggers by individual cities and towns from 1963 to 1967.

Records of the number of harvesting permits issued for the period 1963 to 1967 showed that there was a general decline in the Subordinate Diggers group, while the master diggers group showed only a slight reduction in numbers. The data indicated that only 36 percent of the licensed master diggers and over 71 percent of the subordinate diggers harvested shellfish in Boston Harbor. The remaining diggers harvested in areas on the northern coast of Massachusetts. Forty-one percent of the subordinate diggers were licensed in Quincy and 26 percent in Boston. Quincy also had the most master diggers, 35 percent; Weymouth had 23 percent. The records do not tell whether the permits are used by the harvesters for fulltime or part-time employment.

Production of Shellfish. The number of outlets available to the master diggers is estimated to be 100 wholesale dealers, 60 eating establishments and 140 retail outlets and markets. Additional outlets are located in New Hampshire. All of the shellfish taken out of Boston Harbor, except those dug in the few open areas, must be treated at the Newburyport shellfish treatment plant. A record of the plant's activity serves as an indicator of shellfish production in Boston Harbor. This plant also serves six other communities. These communities, not located within the Boston Harbor area, have contributed about 18 percent of the annual amount of the shellfish processed at the plant over the past seven years, while the communities within the harbor accounted for 82 percent. Of the Boston Harbor portion, Boston and Quincy produced almost 84 percent of the total or 69 percent of the total number of clams processed at the plant.

The volume of shellfish treated at the Newburyport plant from 1935 through 1967 is shown in the accompanying slide. By dividing the 28 years of record into quartiles of seven years, seven years each, the average annual rate of clam treatment and the resulting percent gain or decrease from the period 1940-1946 can be shown as follows:

For the year of record 1940 to 1946, 47,100 bushels were processed. From 1947 to 1953 the average was 54,700 bushels; 1954 to 1960, 37,600 bushels; from 1961 to 1967 the average was only 14,600 bushels. The Boston Harbor rate has been estimated to be 82 percent of this total. For the years 1940 to 1946, 39,000 bushels were treated from Boston Harbor. 1947 to 1953, 41,000 bushels or a 16.1 percent increase over the 1940-1946 period. From 1954 to 1960, 31,000 bushels were treated, a 25.5 percent decrease from the 1940-1946 period. 1961 to 1967 the Boston Harbor rate was estimated to be 12,000 bushels. This is a 66.1 percent decrease from the 1940-1946 period. A definite decrease in shellfish production is shown during the last 10 years. The peak production was in 1951 when 93,700 bushels were processed, which is 7.8 times the 1967 rate of 12,000 bushels. For the last seven years the production from Boston Harbor has averaged 12,000 bushels.

Monthly processing records for the plant at Newburyport are shown in the next slide. This indicates that 65 percent of the shellfish are treated from May through September, inclusively.

Economic Value of Shellfish. On the wholesale market the shellfish are sold and delivered in 65-pound bushel units. The prices of soft-shelled clams are seasonal. During the winter months the market demands are small; however, as warmer weather and the tourist season approach, the prices invariably rise. Prices vary from a low of eight dollars to a high of 12 dollars per bushel. Using an annual shellfish production rate for Boston of 12,000 bushels, the rate for the last seven years, it can be estimated that the basic shipper-market value of the shellfish at $10 a bushel would amount to $120,000 a year.

Shellfish sanitation control officials estimated that over 90 percent of the shellfish processed at the shellfish treatment plant is generally consumed as steamer clams. By allowing one quart of shellfish to a person, the annual production of treated Boston Harbor shellfish would reach well over 410,000 consumers. Of the more than 90 percent shellfish confined to the steamer market, it was estimated that 30 percent is consumed at commercial picnic clambakes or in restaurants and the remaining 70 percent is sold in the retail markets as shell stock over the counter.

Records of the Division of Marine Fisheries show that during the period of July 1, 1966, to June 30, 1967, 12,000 bushels of clams were treated at the Newburyport shellfish treatment plant. Eighty-two percent or 9,900 of the 12,000 bushels were harvested from Boston Harbor. A review of master digger records for the same year indicated that 7,800 bushels, 79 percent, of the treated Boston Harbor shellfish were taken from 12 areas closed by the State Department of Public Health since June 1, 1967.

The potential economic damage resulting from pollution caused the production loss of 7,800 bushels of shellfish, representing an annual shipper-market loss of $78,000 and a general retail loss of between $530,000 to $1,300,000. The result of the closure of these shellfish growing areas is summarized in Table 6 of the Report.

Several factors other than the closing of shellfish beds add to the economic loss. Shellfish beds may be damaged or destroyed by dredging or landfill operations or by the toxic effects of waste discharges. Physical damage or "market refusal" may result from oil spills. The economic damage from such factors is not calculable. Should the water quality of Boston Harbor become further degraded, the State would have no choice but to impose additional limitations.

RECREATIONAL BATHING

Water, polluted by sewage, contains enormous amounts of coliform bacteria that occur typically in the excreta of warm-blooded animals. These bacteria, while not usually harmful in themselves, are used as indicators of fecal pollution and of the possible presence of pathogenic bacteria. Pathogens, if ingested, can cause gastrointestinal diseases. In order to protect the public health and to maintain a high degree of water quality, the Commonwealth of Massachusetts has established a limit, based upon the presence of coliform bacteria, to differentiate between "safe" and "hazardous" swimming waters. A median total coliform

Donald R. Smith

value of less than 700 per 100 milliliters is used to classify coastal waters as SA or SB. These waters are considered to be safe for swimming and other water-contact activities.

In the harbor, bacteria from human wastes constitutes a major water pollution problem. Beaches in Winthrop have been closed to bathing since 1962 as a result of bacterial pollution. Investigations have indicated that the MDC municipal waste discharge at Deer Island is the major source of bacterial pollution of the Winthrop-East Boston section of Boston Harbor. Several other bathing areas in the harbor have been threatened with closure.

In the Boston regional area the bathing beaches are overcrowded. In 1965 all of the Boston swimming areas combined could only accommodate 11,100 bathers. The number of persons on an average weekend in the summer desiring access to swimming areas will reach 49,000 by 1970. There are 10 public beaches operated by the MDC, and several small municipal beaches in the harbor. The MDC beaches cover an area of 640 acres, including over 5.4 miles of shore.

The Metropolitan Area Planning Council has recently completed an open space and recreation study of Boston Harbor. The Council considers the harbor a major recreational center for the Boston area and recommends a program of open space acquisition and development. The recreation plan includes substantial increases in bathing and sport fishing areas and the establishment of additional boating facilities. The Metropolitan Area Planning Council, however, points out, "No improvement or recreational development of the harbor is possible without an end to pollution."

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RECREATIONAL BOATING

Recreational boating in the harbor has been limited by the appearance of the water. The discharge of suspended solids to the receiving waters imparts a gray turbidity to the waters. Dense growths of unsightly attached marine plants stimulated by nutrients are prevalent throughout the harbor at most buoy, pier and marine facilities. Floating debris in the harbor is esthetically unpleasing and a safety hazard, having caused damage to recreational boats.

The damand for recreational boating has increased rapidly in recent years and presently exceeds the supply of launching and mooring facilities. Within the harbor there are 28 recreational boat launching facilities. In addition to trailered boats there are approximately 5,000 pleasure boats moored in the harbor. Thirty-five private yacht clubs and 32 commercial marinas provide these mooring facilities.

SPORT FISHING

Sprot fishing is an important water use in Boston Harbor. Sport fishing is particularly popular off the beaches of Hull, Quincy and Winthrop. Pier fishing is heavy in the South Boston area. In addition, there are several professional charter boat operations who cater to fishing parties.

ESTHETICS

Nutrients and suspended solids have caused undersirable odor problems to certain areas of Boston Harbor.

Extensive growths of sea lettuce are prevalent in three tidal flat areas of Boston Harbor, Winthrop Harbor, Squantum Bay and along the shores of Nut Island. These growths have been stimulated by very high concentrations of inorganic nitrogen and phosphorus contributed by sewage discharges. During low tide the sea lettuce becomes exposed to air and sun and the plants decompose, producing hydrogen sulfide odors. There are reports that Winthrop Harbor residents have been forced to leave their homes to escape the smell. Hydrogen sulfide emmissions from decaying sea lettuce has discolored homes. A contributory cause of the sea lettuce problem in Winthrop Bay is the nutrients added to the harbor from the Deer Island sewage treatment plant.

Upon discharge of suspended solids, the heavier solids settle to the harbor bottom in the vicinity of the points of discharge and form sludge deposits. The organic material in the sludge undergoes a decomposition which utilizes the dissolved oxygen in the overlying waters. When complete depletion of oxygen occurs, the further decomposition of organic matter produces obnoxious hydrogen sulfide gas which bubbles to the surface. Masses of the deposited sludge rise with the gas to the surface where they appear as gray or black odorous clumps and rafts. Sludge deposits in the Fort Point Channel in South Boston are over three feet deep as a result of several combined sewer overflows. The dissolved oxygen is seriously depleted, resulting in undesirable odors from the anaerobic decomposition of the sludge.

COMMERCIAL SHIPPING

The Boston port facilities are concentrated along the Boston Inner Harbor and the Mystic, Chelsea and Weymouth Fore River areas. The main ship channel has a controlling depth of 40 feet; other channels range from 15 to 40 feet.

In 1965 there were 10,600 trips of commercial vessels into the harbor. Passenger and dry cargo vessels constituted 54 percent of the trips; tankers constituted 54 percent, and the remaining 22 percent were attributed to tugboats or towboats. Movements of freight within the confines of the harbor numbered 14,954 of which 72, 15 and 13 percent were from passenger and dry cargo vessels, tankers and tugboats, respectively.

WATER SUPPLY

Harbor water is used by coastal industries for cooling and processing. In 1965 several million gallons of harbor water a day were used. Over 99 percent of this total was for cooling purposes.

Mr. Chairman, this concludes this section of the Report.

CHAIRMAN STEIN: Thank you very much. I believe I had another request ----

MR. YASI: Mr. Chairman, we would like to call now on Commissioner Howard Whitmore, Commissioner of the Metropolitan District Commission.

HOWARD WHITMORE, JR., COMMISSIONER
METROPOLITAN DISTRICT COMMISSION
BOSTON, MASSACHUSETTS

MR. WHITMORE: Mr. Chairman, conferees, ladies and gentlemen. The Metropolitan Sewerage District was established in 1899, the same year in which legislative reports pertaining to the pollution of Boston Harbor and the tidal estuaries and streams tributary to it began to be published and widely circulated.

Briefly stated, the pollution problems of the District, now comprising 42 cities and towns, have arisen principally from two general causes or conditions - the discharge into Boston Harbor of raw sewage from a contributing population of approximately 2 million and the overflow into tributary basins of mixed sewage and stromwater from over-taxed sewers. The overall program of pollution abatement involves additional trunk sewers and plant construction to provide adequate facilities for the collection and disposal of sewage from the metropolitan area.

By Chapter 705 of the Acts of 1945 the Massahcusetts legislature authorized a $15 million bond issue which launched the pollution control program by the Metropolitan District Commission. The initiation of such a program was long before the Federal Government expressed deep concern in matters of pollution abatement. Additional bond authorizations by the Commonwealth since 1945 have brought the total to $119.5 million of which over $104.5 million has been spent. The Federal Government has made available $500,000 in construction grants and recently approved a $1 million demonstration grant for a $4.75 million chlorination and detention chamber now under construction at the Boston University Bridge on the Charles River.

We believe that this ambitious pollution control program has made great progress in restoring Boston Harbor and its three main river tributaries - the Charles, the Mystic and the Neponset - to the benefit and enjoyment of Metropolitan Boston citizens.

This is not the time nor the place to outline in detail what our pollution control program consists of, but it might be mentioned that the carrying out of this extensive program has required varied types of construction such as deep rock tunnels under Boston Harbor, river crossings, open cut trenches mostly below water level, deep construction in heavily traveled thoroughfares, ocean pipe laying, large and small caisson construction has the design and construction of mechanical installations ranging from small pumping stations and large headworks to huge, complex sewage treatment plants.

The initial positive results of the Metropolitan District Commission's overall pollution control program were realized in the summer of 1951 when the effluent from the then recently completed Nut Island Sewage Treatment Plant was chlorinated and the long standing public health hazards in the Quincy shore areas eliminated. During the succeeding years other components of the program were put into operation as they became available, and, as was announced last week, the largest and most important facility of the entire program, the Deer Island Sewage Treatment Plant, became operative. Raw sewage is no longer being pumped into the Harbor, chlorination sufficient for a high "bacteria kill" is in progress and solids are being removed from the sewage.

The Deer Island Treatment Plant provides primary treatment and, at least until recently, such treatment was believed to be sufficient to meet the prescribed water quality standards. However, in anticipation of possible further treatment, the Commission has acquired additional land at Deer Island.

It should be noted that the recently publicized figures as to the cost of the Deer Island Treatment Plant are not correct. The plant actually cost $28 million.

Much has been accomplished; yet, added projects must be undertaken in the furtherance of the overall sewerage program. Included are:

1. NORTH CHARLES RELIEF SEWER

Construction of relief sewers on the north side of the Charles River Basin. Similar to the already completed relief sewer on the south side of the basin, this project will begin in the vicinity of Mount Auburn Hospital and extend to the river crossing at the B. U. Bridge. Another phase of this project will run from Main Street, Cambridge, back to the B. U. Bridge.

2. SQUANTUM FORCE MAIN

Construction of a 24-inch force main between existing Squantum pumping station and the existing MDC Quincy pumping station, a distance of approximately three miles. The sewage from the Squantum area of Quincy is now picked up and pumped from the Squantum pumping station to Moon Island. Under the procedure mentioned above it will be picked up and pumped at the Quincy MDC pumping station to the Nut Island plant.

3. BOSTON MARGINAL CONDUIT PUMPING STATION

Installation of a pumping station in the vicinity of the existing Charles River Dam which will be used during times of high tide to pump the flow in the Marginal Conduit to tidewater. This installation will have a capacity of 140,000,000 gallons per day.

4. REHABILITATION OF TIDE GATES

There are approximately 200 or more tide gates which must be rehabilitated. Many have had no work done on them since they were installed with the result that there is tremendous infiltration of salt water into the sewerage system.

The Metropolitan District Commission will continue to provide leadership and be the forerunner in the field of pollution control and abatement. It appreciates the assistance and counsel it receives from the Federal Water Pollution Control Administration and its sister State District. It may not always agree with others as to methods and procedures, causes and conditions, water quality standards and testing, but it will gladly cooperate and assist to obtain the common objectives so urgently needed for shellfish areas, recreational boating, fishing and bathing, and most importantly the health of the public.

In conclusion may I refer to U. S. Senate Document No. 49, dated August 2, 1967, entitled "Manpower and Training Needs in Water Pollution Control." This is a report of the Department of the Interior, Federal Water Pollution Control Administration to the Congress of the United States. Reference is made in the report to the urgent needs for the recruitment and training of personnel to man and operate sewage treatment facilities. The MDC needs such assistance badly, particularly financial assistance and hopes such assistance may be authorized and forthcoming soon from the Federal Government.

Thank you.

CHAIRMAN STEIN: Thank you, Mr. Whitmore. Are there any comments or questions?

MR. KLASHMAN: Mr. Whitmore, I would like to ask a couple of questions if I might. You made a reference to the fact that there are approximately 200 tide gates which must be rehabilitated. How long have these been in need of rehabilitation and when do you anticipate that they will be rehabilitated?

MR. WHITMORE: I could not say exactly how long they have been in existence, but it is many, many years.

MR. KLASHMAN: I meant how long have they been in need of rehabilitation?

MR. WHITMORE: Well, most of these are associated with the Boston system, and we are not particularly -- I am not particularly knowledgeable as to just how long each one has. I do know we are working with the city of Boston. We have already started to repair four or five that are in process now, and we are certainly going to assist the city of Boston in the repair and rehabilitation if not replacement of some of these tide gates.

MR. KLASHMAN: Do you have any idea when or what the schedule is for getting the whole 200 rehabilitated?

MR. WHITMORE: No, I haven't, and I don't think they have all been scheduled. We are trying to work out the problem at the moment.

MR. KLASHMAN: Is it something in the order of maybe five or ten years?

MR. WHITMORE: I'll have to ask one of my assistants if he knows when this program will be completed.

VOICE: About five years.

MR. KLASHMAN: Five years -- in other words, by 1973 or so they should be cleaned up? The other question that I would like to ask, Mr. Whitmore, has to do with your closing statement dealing with the manpower and training needs and the need for the MDC to have financial assistance. Could you please explain what you had in mind there as to what type of financial assistance you were talking about?

MR. WHITMORE: Well, if I'm properly informed; and I attended, as you know, a meeting in Washington several weeks ago in which the financial assistance available to the States and perhaps through the State to the Metropolitan District Commission -- there was a great deal of discussion as to Federal assistance. One was this matter of assistance in the training or the recruitment and training the necessary personnel which are properly classified as very, very difficult and very acute in the country as a whole. The Federal Pollution Control Division, as I understood it at that meeting, is providing no direct financial assistance in the recruitment and training of such personnel; and such a critical situation is going to become worse if we don't have such a program.

MR. KLASHMAN: I think you are right. The Federal Water Pollution Control Administration is working with the Department of Labor and the Department of Health, Education, and Welfare, and we certainly do have plans to do more of this; and you are right, that we do have to do more. But, Mr. Whitmore, there is something that I don't understand completely. Let's suppose that we had one of the best training programs with plenty of money. What do you pay your waste treatment plant operators and are they competitive with those salaries that are paid say in the city of Chicago, the city of New York, or in other places? Are you competitive?

MR. WHITMORE: No, I don't think we are.

MR. KLASHMAN: Well, what is being done about this?

MR. WHITMORE: Well, in our program to get the Deer Island treatment plant operative, we worked with State agencies and were given permission to recruit some people on what we call a consultant basis, which means they are outside of the general pay scale and plan of the Commonwealth of Massachusetts and the personnel administration field. However, these were only for the top technicians or top management level of the Deer Island plant.

We are trying to upgrade the bulk of our personnel salaries which fall in the middle or lower grades, and these, of course, cause some concern because many of them have the same titles and the same job responsibilities as many other positions throughout the entire Commonwealth. So, to upgrade and to pay these people more money means you, perhaps, have to do the same for several hundred employees throughout the entire Commonwealth, which is a financial strain.

MR. KLASHMAN: Mr. Whitmore, what do you pay your workmen?

What is the range from the lowest grade up to the highest?

MR. WHITMORE: Oh, from $6,000 to $6,500 to up about $12,000.

MR. KLASHMAN: And what do you think you have to pay in order to be competitive?

MR. WHITMORE: Well, strange as it may seem, the most competitive situation occurs in the field of the lowest paid employees, in the field of skilled laborers, sewage treatment plant attendants and men of that nature. The others are scarce, but we have been able to recruit them. I think it is a case of one State's robbing another as these treatment plants are built throughout the country. As you know, many hundreds of them are at least in the planning stage. Some are being built. The one who pays the most money is going to receive the employees, so we must constantly be in the process of recruitment and training in order to assure ourselves of a staff to operate these facilities.

MR. KLASHMAN: Could you explain to us -- I take it from what you have said that your hands are tied, apparently; that there are some restraints over which you have no control and that do not permit you as the Commissioner and manager of this system to pay those salaries that are competitive - could you explain to us what these constraints are?

MR. WHITMORE: Well, there are a wide range of restraints and restrictions. We have very little flexibility. We, like other State agencies, must live within the prescribed rules and regulations of recruitment largely through Civil Service, and we must pay according to the personnel standards of the Commonwealth. And it is this restriction that has been very hard for us to recruit people to operate. We are working and we have gained sympathy in the higher echelons of State management to pay more, which is the essence of recruiting more people.

MR. KLASHMAN: The thing that has me a little confused is that

I don't see what the operation of the MDC waste treatment facility has to do with the operation of other parts of the State government. It seems to me that this is a problem for the other departments, obviously. But if there is a problem in the operation of the MDC waste treatment facility and if the personnel system is not adequate to meet those needs, then it seems to me the system has to change. Would you agree with that?

MR. WHITMORE: The system has to what?

MR. KLASHMAN: The system has to change.

MR. WHITMORE: I think that is very obvious, and I think that we have been a prime example of it much to our sad occurrences that have occurred.

Let me say this to you. A detailed explanation of the State personnel proceudres and administration would be a long and time-consuming effort. But, as you know, we require in our staffing of the Deer Island plant some 50 skilled laborers. Well, skilled laborers are a common classification throughout the entire operation of the State government. We have skilled laborers in every agency or every department of the State, and they are all classified the same. They do basically the same work. Their scale of pay runs for seven years from minimum to maximum, and these people are classified the same as in other departments. Many of the other positions, although some are distinct, many of the same conditions are true throughout the entire Commonwealth system.

MR. KLASHMAN: Mr. Whitmore, do you know of any other system as large as yours -- New York, Denver, Chicago -- any place in the country that has these constraints?

MR. WHITMORE: That I could not say. I'm not thoroughly acquainted with the Civil Service or recruitment or the personnel policies in other States. I have all I can do to understand my own. I would like to say this, that the Commission has recently signed an agreement with a training school, and they are paying the entire freight -- the Commission is -- without any Federal assistance. We are running a training course or will be, commencing June 15 to go to the end of the year, to provide training to get some assistance in recruitment and hopefully to have a reserve of persons available, so that we will never be in the position where we can't operate these very large and important facilities.

MR. KLASHMAN: Do you actually think that you are going to be able to manage with your present system to get the help you need?

MR. WHITMORE: Well, we are hopeful of it. We are doing it with very meager forces at the present time, and it is a matter of great concern to us. But we feel that many of those who have been recruited in the last few months need and want to have some more specific training in the operation and in the work they are responsible for. We will give this group the specific training which will benefit them, as well as the operation, for it provides them the opportunity to become more experienced and to progress up the ladder and therefore receive higher wages.

MR. KLASHMAN: How many men do you need to operate that plant?

MR. WHITMORE: Over 200.

MR. KLASHMAN: How many do you have now?

MR. WHITMORE: I think we have about 175.

MR. KLASHMAN: So you are only 25 short?

MR. WHITMORE: Well, we have, as you know, one or two other phases to the plant. The total facility down there to be manned -- we have the Winthrop facility, so called, under construction. We will need some more men for that, and we will need some more men as other refinements of the plant are made.

MR. KLASHMAN: What will you need ultimately?

MR. WHITMORE: I'm not certain, but I think around 225.

MR. KLASHMAN: You have 175?

MR. WHITMORE: Roughly.

MR. KLASHMAN: Mr. Whitmore, thank you very much. You are certainly working under, obviously, very difficult conditions.

MR. YASI: Mr. Chairman, I think it is quite obvious that we have the problems that Commissioner Whitmore indicated concerning hiring, but I hope that Mr. Klahsman's remarks will not be taken in the wrong light either publicaly or reported to indicate that first we have an upgrading and then we train the people. As the Director well knows, I have been working fiercely for the last year on a New England-oriented water pollution control abatement school. We have, needless to say, been tremendously concerned about this. We are considerably depressed at the moment that the Federal agency has not been able to cost share money. By the way, this is not a criticism. I say that with every sincerity. I want this in the record to get to the Secretary. I hope this won't be taken as a criticism. We have passed a special Act of the legislature in Massachusetts to permit this. We have fulfilled all of the legal obligations. We certainly hope that the fact that recruitment pay is not sufficient will not in any way deter the Federal cost-sharing of this program, which was anticipated, which in our own legislative act may well be required and certainly which is necessary to the interstate commission and his program.

With that I don't think you intended to ----

MR. KLASHMAN: Let me make very clear what I do mean. It seems to me in the operation of a plant the size of the MDC, that it is absolutely impossible to have the personnel system operated by the State legislature. It seems to me this would be the same as trying to take the boiler plant in one of the DuPont factories and have all the details of the plant handled by top management. As you very well know, such an operation is decentralized down to the plant manager, who has wide discretion in how he can best manage it. And it just seems to me that there is something wrong with the system. I'm not criticizing anybody in particular. I, too, am from Massachusetts, and I am very proud of being a native here. But I think that sometimes we have gone on for many years in a system that may need change, and all I am saying is that I think this has to be looked into because it may be that the solution is in some type of a different system for a setup like the MDC.

MR. YASI: I think, Mr. Klashman, I prefaced my remarks -- I know I did -- with the statement that the system leaves something to be desired. I don't think this relates entirely nor exclusively to water pollution control, and, frankly, I don't think this is the place for it, but be my guest.

MR. WHITMORE: Perhaps, I can expand on what I said before about this problem. I referred, as you recall, to the fact that we were given permission or we were assisted in obtaining consultants, which, of course, are obtained outside the restriction of the personnel administration and the salary scales. We were also given the opportunity and the right to recruit some people at other than the minimum of their particular job pay grade. In other words, the pay scale runs from a minimum over seven years to a maximum. Through the Department of Personnel and the Commissioner of Administration and Finance, we were given the opportunity to recruit some people at the fourth step or the fifth step, which meant that we were recruiting at somewhat better than at the minimum.

MR. KLASHMAN: What is the minimum, Mr. Whitmore?

MR. WHITMORE: It all depends on what the job is.

MR. KLASHMAN: What is the minimum of the lowest grade?

MR. WHITMORE: I think it's around $5,800.

CHAIRMAN STEIN: I think this has been an interesting discussion. I think Mr. Yasi's points are well taken. I don't know that it is indigenous to this field, but I think from all the talk we have had, the recognition is that no plant, particularly a complicated system like this, is better than its personnel and management. It just doesn't run itself. It is also fairly evident that the Federal Government does not have at the present time a tremendously well financed program for the training of these operators. I think you are going to have to expect that if that is going to be done, you are going to have to have Congressional authorization and budget support. You know what the general situation is on that.

There is one other point that generally comes up and this possibly is a little different from training. Let's suppose the people were trained and let's suppose they were trained first. Generally, States do have a problem in at least adjusting their wage rates to compete with other State governments. I think the large municipalities have that same kind of problem. The question comes up when you are dealing with a large municipal commission such as the Metropolitan District Commission whether they will have the flexibility in handling their municipal problems - competing with other people in the city and with other cities - if they are tied to a State system. I do think this is a question which certainly merits consideration.

I know this, that we can, for example, get someone just as competent working in Salt Lake City for a lot less than you can get that person to work in Chicago. I think this is about the situation. Maybe you have this in Boston and this needs careful consideration.

Thank you very much, sir.

MR. NEWMAN: Mr. Chairman and conferees, I would now like to have Mr. Myron Knudson, Chief of the Field Operations at the Northeast Water Quality Management Center, Needham, Massachusetts, present the remainder of the report which includes a discussion of water quality.

MYRON KNUDSON, DEPUTY DIRECTOR, NORTHEAST WATER QUALITY MANAGEMENT CENTER, U. S. DEPARTMENT OF THE INTERIOR, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, NEEDHAM, MASSACHUSETTS

MR. KNUDSON: PRESENT WATER QUALITY

The summary of water quality parameters bacteria, dissolved oxygen, benthic life, nutrients and benthal deposits presented in this report are based upon a survey of Boston Harbor conducted during July and August 1967 by the Federal Water Pollution Control Administration. Data obtained during the field investigations are available from two reports: "Chemical and Physical Aspects of Water Quality, Charles River and Boston Harbor, Massachusetts," February 1968; and "Biological Aspects of Water Quality, Charles River and Boston Harbor, Massachusetts," January 1968, United States Department of the Interior, Federal Water Pollution Control Administration.

BACTERIA

Water polluted by wastes from warm-blooded animals, including humans, frequently contain pathogenic bacteria. Ingestion of these pathogens by drinking polluted water or by eating raw or partially

Myron Knudson

cooked shellfish grown in these waters can cause gastrointestinal diseases such as typhoid fever, dysentery and diarrhea. The infectious hepatitis virus, as well as other enteric viruses, may also be present. Body contact with water polluted by bacteria can also cause eye, ear, nose, throat or skin infections. Therefore, bacterial pollution presents a helath hazard not only to those who come in contact with polluted waters but also to those who may eat shellfish taken from the waters.

Sewage and some industrial wastes also contain bacteria of the coliform group which typically occur in excreta or feces of warm-blooded animals and are readily detectable. Although most are harmless in themselves, coliform bacteria are always present in waters polluted by warm-blooded animal wastes and are considered indicators of the probable presence of pathogenic bacteria. The Commonwealth of Massachusetts evaluates water quality on the basis of sanitry survey findings and total coliform content. Recently, refined methods for isolation and detection of Salmonella organisms have made it practical to test for these specific pathogenic bacteria.

The coliform group usually is designated as total coliforms, and most bacterial standards are set using total coliform limits. Included in the total coliform bacteria are fecal coliforms. A separate test can be performed on a water sample to determine the number of fecal coliforms present. Since fecal coliforms can only come from warm-blooded animals, they are considered proof of fecal pollution. The results of the determinations are expressed in terms of coliforms per 100 milliliters of water. One hundred milliliters is approximately one-half cup.

The chain of disease transmission by pathogenic bacteria from human waste through shellfish which are eaten raw or insufficiently cooked has been well established. In an attempt to control such disease transmission, the National Shellfish Sanitation Program was established in 1925. This is a cooperative program between the States, the Public Health Service and the shellfish industry with the goal of safety utilizing this valuable natural resource. The Massachusetts Department of Public Health uses the guides set forth in the National Shellfish Sanitation Manual of Operations, Part I, to properly classify the suitability of estuarine waters for shellfish harvesting. The water quality standards adopted by the Massachusetts Water Resources Commission follow similar guides for the bacterial quality of Class SA, SB and SC waters. However, the water quality classifications do not necessarily mean that the shellfish beds, under the guides of the National Shellfish Sanitation Program, will be classified in the same manner. The guides are summarized as follows:

Approved or open beds have a Class SA water quality classification, which states that coliform bacteria not exceed a median value of 70 per 100 milliliters.

Restricted shellfish beds have a Class SB water quality classification, which states that coliform bacteria not exceed a median value of 700 per 100 milliliters.

Prohibited or closed shellfish beds have a Class SC water quality classification, which states that coliform bacteria exceeds that of the restricted areas.

Licensed commercial diggers harvesting from shellfish beds classified as approved are permitted to sell directly to the wholesale and retail market. A restricted classification requires that the harvested shellfish be treated in an approved shellfish treatment plant to remove the excess bacteria. This process of cleansing shellfish is called depuration. For Boston Harbor the depuration facility is located in Newburyport, Massachusetts. No harvesting of shellfish for human consumption is permitted from prohibited shellfish beds.

During the 1967 study of Boston Harbor, excessive counts of coliform bacteria were found. Total coliform counts as great as 520,000 per 100 milliliters were found in the Inner Harbor area. In general very high counts were found in the northern portion of the harbor, while Quincy, Hingham and Hull Bays in the southern portion would probably meet Class SB water quality criteria for bacteria. One station in western Quincy Bay would probably satisfy the coliform standards of Class SA waters. Average total coliform concentrations found during July and August of 1967 are shown in Figure 2.

Tests for pathogenic bacteria of the genus *Salmonella* were conducted in Boston Harbor. Three of the five sampling swabs placed in the harbor to collect these organisms were positive for *Salmonellae*. Since almost all serotypes of *Salmonella* are known to be disease-procedures in warm-blooded animals, including man, their presence in these waters is proof of a continuing health hazard.

DISSOLVED OXYGEN

The oxygen demand of sewage and industrial wastes, as measured by the biochemical oxygen demand test, indicates the waste's potential for reducing the dissolved oxygen content of the receiving water. Adequate levels of dissolved oxygen are necessary to support fish and other aquatic life. If dissolved oxygen becomes totally depleted, obnoxious odors, mostly from hydrogen sulfide gas, result, causing an unpleasant environment for persons living or working nearby. The hydrogen sulfide given off may turn nearby houses, bridges or other painted structures black.

Water quality standards adopted by Massachusetts require that for Class SB water the dissolved oxygen be "not less than five milligrams per liter at any time" and for Class SC water, the lowest classification of salt water, "not less than five milligrams per liter during at least 16 hours of any 24 hour period, nor less than three milligrams per liter at any time." Of the 18 stations sampled during July and August of 1967, only six met the Class SC standard. Furthermore, only two stations met the tentative recommendations of the National Technical Advisory Committee that "Dissolved oxygen concentrations in estuaries and tidal tributaries shall not be less than 4.0 milligrams per liter at any time or place..." "...for the protection of marine resources..."

Excessive phytoplankton activity is suggested by the wide fluctuation of dissolved oxygen during the latter portion of the 1967 survey shown in Figure 6 which follows Page 52. Under normal conditions, phytoplankton, primarily algae, produce oxygen by photosynthesis and utilize oxygen by respiration. However, when excessive nutrients and sunlight are present, the phytoplankton population can rapidly expand, resulting in high dissolved oxygen caused by an accelerated photosynthesis. During night or heavily clouded periods of daylight the respiration of this expanding population can overtax the dissolved oxygen supply of the water, resulting in serious oxygen depletions.

BENTHIC LIFE

The benthic organism community is a convenient measure of the degree of organic pollution. If the water is not grossly polluted, the benthic population would be comprised of several kinds of organisms, each with a relatively low population. Certain clams, crabs, nematode worms, starfish, shrimp, sowbugs and mussels would normally be present. Grossly polluted areas would normally have a few kinds of organisms in great abundance. Organisms such as polychaete worms and scuds would be dominant.

All reaches of Boston Harbor and each of its tributary streams, except the inland marine reaches of the Weir and Weymouth Back Rivers, were polluted. This was evidenced by a paucity of kinds of organisms associated with benthic deposits. Polychaete worms were found in all harbor sediments; in fact, they were the only life-forms found at three stations. Scuds were also found at a majority of the sample points. These two groups of benthic organisms were dominant in kind and number over the few sowbugs, shrimp, snails, nematode worms and starfish found at the other stations. Polychaete worms were considered sufficiently common to show areas and degrees of organic over-enrichment.

A density of polychaetes greater than 200 per square foot is considered indicative of excessive enrichment. This density was exceeded in all of Boston Harbor except those waters associated with the inland sectors of Quincy Bay and those seaward along a relatively narrow course through Nantasket Roads to the southern mouth of the harbor at Massachusetts Bay as shown in Figure 7 which follows Page 54. About seven square miles, or 30 percent of the harbor inland from Massachusetts Bay were grossly polluted based upon polychaete worm densities in excess of 200 per square foot.

NUTRIENTS

The average values of ammonia nitrogen and soluble phosphorus were equal to or greater than 100 and 40 micrograms per liter, respectively, in all areas of Boston Harbor inland from its mouth near Massachusetts Bay. Such high concentrations of nutrients caused overly enriched conditions that stimulated dense populations of phytoplankton which exceeded 1,000 per milliliter in about 16 square miles, or 66 percent of the harbor. Areas of excessive nutrient concentrations, as indicated by phytoplankton, are shown on Figure 8.

In addition to causing excessive phytoplankton populations, the nutrients stimulated dense growths of attached marine plants. Observations throughout Boston Harbor disclosed such growths on most buoy, pier and marine facilities. Several intertidal and shallow areas of the harbor and certain reaches of Winthrop Bay supported dense growths of attached marine algae. These caused noxious conditions in Winthrop Bay, unsightly growths at marine facilities and increased maintenance costs associated with buoys and piers. In Winthrop Bay, decomposing masses of sea lettuce have caused hydrogen sulfide emissions sufficient to discolor paint on nearby dwellings.

BENTHAL DEPOSITS

Municipal and industrial wastes discharged into the receiving waters of Boston Harbor resulted in extensive deposits of decaying organic matter and incorporated oily residues covering much of the harbor bed. Oily sludge deposits in the Fort Point Channel were more than three feet deep. Hydrogen sulfide gas bubbles effervescing from the sludge in this reach rose to the surface and burst, creating the odor of rotten eggs. Although not as deep, sludge with similar oil composition and hydrogen sulfide odor was found in several other areas.

The presence of high percentages of organic carbon and organic nitrogen is an indication of sludge deposits resulting from the discharge of municipal and industrial wastes, while sludges low in these organics may be considered inorganic, or "natural" deposits. The highest percentages of organic carbon (23.5) and organic nitrogen (1.29) associated with harbor sludges were found in the Fort Point Channel. This reach was intensively polluted and septic. Such values are similar to those associated with raw wastes from packing houses, sewage or rapidly decomposing sludge. In samples from the remaining harbor stations organic carbon varied from 0.4 to 5.5 percent, and organic nitrogen varied from 0.04 to 4.41 percent.

SURFACE WATERS

Sewage-like solids, other assorted rejectamenta and oily slicks also were observed in the surface waters of most protions of Boston Harbor. Such materials were abundant near the Deer Island sewer outfalls at the mouth of Boston Harbor, near Moon Island, the north end of Long Island the inland reach of Quincy Bay.

This completes the report.

(The Federal Report on Pollution of the Navigable Waters of Boston Harbor, in its entirety, follows.)

CHAIRMAN STEIN: Thank you.

On the basis of expert local advice, the opinion is that we should recess for lunch now or we will have to go until 1:00 o'clock. We will stand in recess now until 1:00 p.m.

(Whereupon the conference recessed for lunch at 11:45 a.m.)

REPORT ON POLLUTION OF THE NAVIGABLE WATERS OF

BOSTON HARBOR

U.S. DEPARTMENT OF THE INTERIOR

FEDERAL
WATER POLLUTION CONTROL
ADMINISTRATION

MAY 1968

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PORTLAND
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BOSTON
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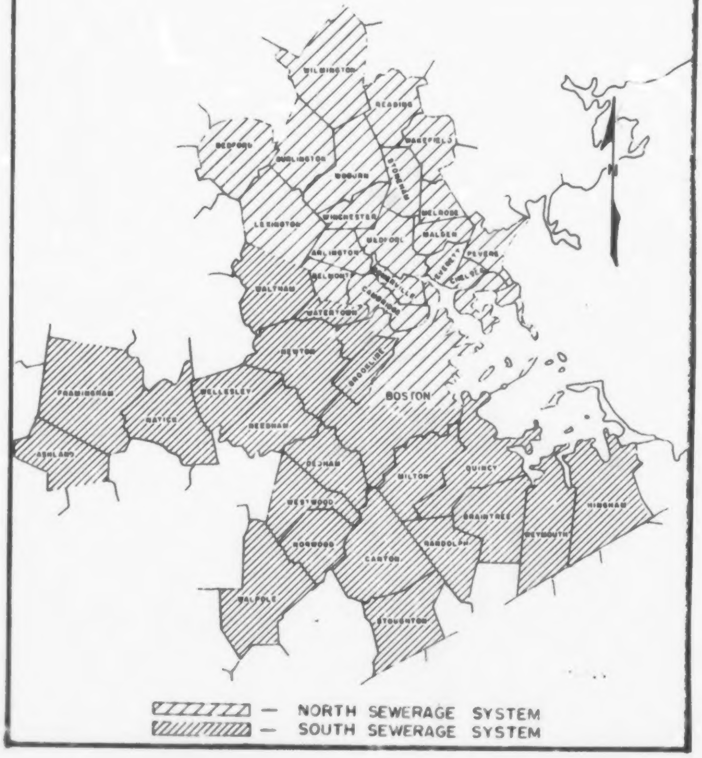
STUDY AREA

METROPOLITAN DISTRICT COMMISSION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BEDFORD
BURLINGTON
WAKEFIELD
WOBURN
STONEHAM
LEXINGTON
WINCHESTER
MELROSE
MEDFORD
MALDEN
ARLINGTON
REVERE
EVERETT
BELMONT
SOMERVILLE
CHELSEA
WALTHAM
CAMBRIDGE
WATERTOWN
NEWTON
BROOKLINE
FRAMINGHAM
WELLESLEY
BOSTON
NATICK
NEEDHAM
ASHLAND
DEDHAM
MILTON
QUINCY
WESTWOOD
BRAINTREE
HINGHAM
WEYMOUTH
NORWOOD
RANDOLPH
CANTON
WALPOLE
STOUGHTON
N
— NORTH SEWERAGE SYSTEM
— SOUTH SEWERAGE SYSTEM

REPORT ON POLLUTION OF
THE NAVIGABLE WATERS OF
BOSTON HARBOR

United States Department of the Interior
Federal Water Pollution Control Administration
Northeast Region
Boston, Massachusetts

May 1968

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SUMMARY AND RECOMMENDATIONS

SUMMARY

As a result of pollution of the waters overlying the shellfish growing areas of Boston Harbor, the Commonwealth of Massachusetts has issued orders prohibiting, or otherwise restricting the harvesting of shellfish for human consumption in certain areas in order to protect the public health and welfare. These restrictions, as of April 1, 1968, are summarized below:

Shellfishing prohibited (since 1941)	1,560 Acres	35 percent
Shellfishing prohibited (since June 1967)	1,113	25
Shellfishing restricted	1,319	29
Shellfishing approved	500	11
	4,492 Acres	100 percent

Pollution in the Boston Harbor area results from the following waste discharges and activities:

Municipal Wastes

- Metropolitan District Commission's Deer Island sewage treatment plant
- Metropolitan District Commission's Nut Island sewage treatment plant
- City of Boston's Moon Island facility
- Town of Hull

Industrial Wastes

Combined Sewer Overflows

Tributary Streams

Federal Installations

  Boston Naval Shipyard

  Navy Ships Berthed in Boston Harbor

  Coast Guard's Base Boston

  Nike Ajax Site B-36 (Hull)

Watercraft Wastes

Debris and Refuse

The areas of the Harbor in Boston, Hull, Quincy and Weymouth recently closed to shellfish harvesting cover 25 percent of the available shellfishing growing areas. These same areas accounted for 79 percent of the shellfish harvested from the Harbor during the year July 1, 1966 to June 30, 1967, according to records of the Massachusetts Division of Marine Fisheries. This 79 percent, or 7,800 bushels of shellfish, represent a basic shipper market loss of $78,000 a year. In terms of the economic value to the food industry, the maximum annual loss is estimated to be $1,300,000.

In addition to causing the restriction of shellfish harvesting, pollution has resulted in restricted, or otherwise limited, recreational bathing, recreational boating and sport fishing activities and has reduced the esthetic value of the water, beaches and adjoining areas of Boston Harbor.

The predominant factor in restricting the harvesting of shellfish is the presence of coliform bacteria. Although most are harmless in themselves, coliform bacteria are always present in waters polluted by warm-blooded animal wastes and are considered indicators of the probable presence of pathogenic bacteria. During 1967, excessive coliform bacteria, as great as 520,000 per 100 ml of water, were found in the Inner Harbor area. In general, very high numbers were found in the northern section of the Harbor, while Quincy, Hingham and Hull Bays in the southern portion probably satisfy the coliform standards for Massachusetts Class SB waters. Class SB waters are generally considered acceptable for water contact activities and shellfish harvesting with depuration.

Water Quality Standards adopted by Massachusetts require that for Class SB water the dissolved oxygen be "not less than 5 mg/l at any time" and for Class SC water, the lowest classification of salt water, "not less than 5 mg/l during at least 16 hours of any 24-hour period, nor less than 3 mg/l at any time." Of the eighteen stations sampled during July and August of 1967, only six met this Class SC standard.

Wide fluctuations of dissolved oxygen values occurred in Boston Harbor, apparently caused by large numbers of phytoplankton. Such fluctuations, with resulting serious oxygen depletions, are often caused by rapidly expanding phytoplankton populations in waters having very high nutrient concentrations.

The paucity of kinds of organisms associated with the benthic deposits, show that all reaches of Boston Harbor and each of its tributary streams, except the inland marine reaches of the Weir and Weymouth Back Rivers, were polluted. Based upon the biological conditions about seven square miles, or 30 percent of the Harbor, were grossly polluted. Chemical analysis of harbor sediments for carbon and nitrogen support the biological findings of organic enrichment. Extensive deposits, some greater than three feet deep, of decaying organic matter and incorporated oily residues covered much of the Harbor.

Substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution caused by sewage, industrial waste and other waste sources discharged to the navigable waters of Boston Harbor and its tributaries, and by the action of State authorities. Accordingly, the pollution of those navigable waters is subject to abatement under procedures described in Section 10 of the Federal Water Pollution Control Act, as amended.

RECOMMENDATIONS

The following are recommendations for abating the existing water pollution and for ensuring the adequate water quality required for legitimate water uses, including shellfish harvesting, of Boston Harbor. These recommendations are designed for the present conditions. Any basic alteration in the harbor's condition, either natural or caused by man, may necessitate a review of the requirements.

1. All waters in Boston Harbor shall meet the water quality standards, including the implementation and construction schedules, submitted by the Commonwealth of Massachusetts and approved by the Secretary of the Interior. These standards are at the end of this recommendations section.
2. a. The Deer Island sewage treatment facility shall be fully staffed and operation continued.
   b. A technical committee shall be established to determine if the standards of water quality are being met. The committee shall report its findings to the conferees in six months.
   c. An evaluation of the effect of the treated discharges of both the Deer Island and Nut Island facilities on the harbor waters shall be completed as soon as possible. If needed, a survey should be undertaken to determine what additional pollution abatement measures are necessary.

d. The evaluations and studies shall also consider the need for discharging all wastes, including dry weather flows and combined sewer overflows, to waters other than those of Boston Harbor.

e. A proposed plan to accomplish any additional measures shall be reported to the conferees by June 1969.

3. a. The City of Boston shall formulate and implement the complete phasing out of the Moon Island facility.

b. As an interim measure, continuous disinfection of all discharges from Moon Island, in accordance with orders established by the Massachusetts Division of Water Pollution Control, shall be provided.

4. a. Appropriate local, State and Federal agencies shall adequately control the dumping of garbage or refuse along the shores and in the waters of the harbor.

b. Material in existing dump sites, sunken vessels, dilapidated piers, wharves and other structures, and other sources and sites of debris and rubbish, shall be removed and the appearance of the bank restored to an esthetically acceptable condition.

5. The problem of pollution from vessels in Boston Harbor is serious. A technical committee, including State and Federal representatives, shall be established to consider the vessel pollution problem and provide the conferees with recommendations in six months.

6. Industry and local, State and Federal agencies shall complete and implement contingency plans for the most appropriate and effective methods of preventing and handling oil pollution.
7. All municipalities, industries and the Metropolitan District Commission shall continue immediate remedial action, including repair or replacement, as needed, of all storm overflow structures and tide gates to eliminate backflow from the harbor and its tributaries into the sewerage system.
8. All Federal facilities shall construct and operate treatment facilities required by Executive Order 11288.

COMMONWEALTH OF MASSACHUSETTS

WATER QUALITY STANDARDS

Division of Water Pollution Control acting under the authority of Section 27 (4) of Chapter 21 of the General Laws held a public hearing on February 17, 1967, relative to the establishment of standards of water quality for the waters of the Commonwealth. The hearings were held in accordance with the provisions of the State Administrative Procedures Act (Chapter 30A of the General Laws). The standards were approved by the Water Resources Commission, the Commissioner of Public Health, and adopted by the Division on March 3, 1967, and were filed with the Secretary of State on March 6, 1967. The standards were approved by the Secretary of the Interior on August 10, 1967.

1. General - To achieve the objectives of the Massachusetts Clean Water Act and to assure best use of the waters of the Commonwealth, the following standards are adopted and shall be applicable to all waters of the Commonwealth or to different segments of the same waters. The Classes shall be assigned by the Division of Water Pollution Control.

In the classification of waters due consideration will be given to all factors involved including public health, public enjoyment, propagation and protection of fish and wildlife, and economic and social development. Classifications are not intended to permit indiscriminate waste disposal or to allow minimum efforts of waste treatment under any circumstance.

When an effluent is permitted to be discharged to the receiving waters, cognizance shall be given both in time and distance to allow for mixing of effluent and stream. Such distances required for complete mixing shall not affect the water usage Class adopted.

Recommendations on other waste parameters will constitute a portion of the continuing effort of the Division as improved standard methods are developed or revisions consistent with the enhancement of the waters of the Commonwealth are justified.

Water quality parameters not specifically denoted shall not exceed the recommended limits on the most sensitive and governing water class use. In areas where fisheries are the governing consideration and approved limits have not been established, bio-assays shall be performed as required by the appropriate agencies.

MASSACHUSETTS

Coastal and Marine Water Standards of Quality

	Class SA - Suitable for any high quality water use including bathing and water contact sports. Suitable for approved shellfish areas.	Class SB - Suitable for bathing and recreational purposes including water contact sports; industrial cooling; excellent fish habitat; good aesthetic value and suitable for certain shellfisheries with depuration. (Restricted Shellfish Areas).	Class SC - Suitable for aesthetic enjoyment; for recreational boating; habitat for wildlife and common food and game fishes indigenous to the region; industrial cooling and process uses.
1. Dissolved Oxygen	Not less than 6.5 mg/l at any time.	Not less than 5.0 mg/l at any time.	Not less than 5 mg/l during at least 16 hours of any 24-hour period nor less than 3 mg/l at any time.
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None allowable	None allowable	None except that amount that may result from the discharge from a waste treatment facility providing appropriate treatment.
3. Color and turbidity	None in such concentrations that would impair any usages specifically assigned to this class.		
4. Coliform bacteria per 100 ml	Not to exceed a median value of 70 and not more than 10% of the samples shall ordinarily exceed 230 during any monthly sampling period.	Not to exceed a median value of 700 and not more than 2300 in more than 10% of the samples during any monthly sampling period.	None in such concentrations that would impair any usages specifically assigned to this class.
5. Taste and odor	None allowable	None in such concentrations that would impair any usages specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.	
6. pH	6.8 - 8.5	6.8 - 8.5	6.5 - 8.5
7. Allowable temperature increase	None except where the increase will not exceed the recommended limits on the most sensitive water use.		
8. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the water for any other usage.		
9. Radioactivity	None in concentrations or combinations which would be harmful to human, animal, or aquatic life for the appropriate water use. None in such concentrations which would result in radio-nuclide concentrations in aquatic life which exceed the recommended limits for consumption by humans.		
10. Total phosphate	Not to exceed an average of 0.07 mg/l as P during any monthly sampling period.		
11. Ammonia	Not to exceed an average of 0.2 mg/l as N during any monthly sampling period.	Not to exceed an average of 0.2 mg/l as N during any monthly sampling period.	Not to exceed an average of 1.0 mg/l as N during any monthly sampling period.

NOTES:

1. Coastal and marine waters are those subject to the rise and fall of the tide.

2. Appropriate treatment is defined as the degree of treatment with disinfection required for the receiving waters to meet their assigned state or interstate classification and to meet the objectives of the water quality standards. Disinfection from October 1 to May 1 may be discontinued at the discretion of the Division of Water Pollution Control.

3. The water quality standards do not apply to conditions brought about by natural causes.

4. The waters shall be substantially free of pollutants that will:

   (1) unduly affect the composition of bottom fauna

   (2) unduly affect the physical or chemical nature of the bottom fauna

   (3) interfere with the spawning of fish or their eggs

5. The standards shall apply at all times in coastal and marine waters

6. The amount of disinfection required shall be equivalent to a free and combined chlorine residual of at least 1.0 mg/l after 15 minutes contact time during peak hourly flow or maximum rate of pumpage.

Water Resources Commission
Division of Water Pollution Control

BOSTON HARBOR WATERS CLASSIFICATION*

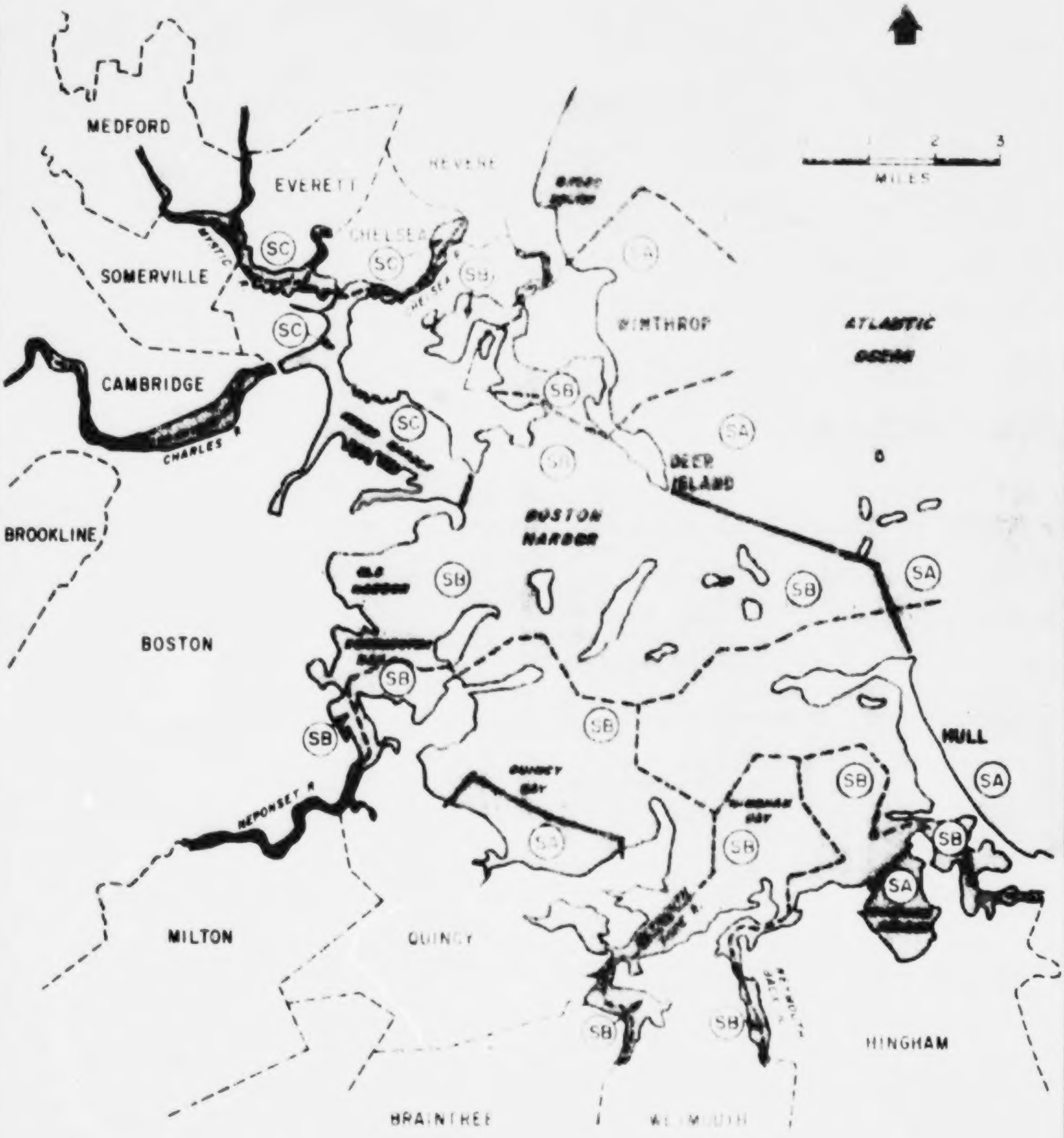
BOUNDARY	PRESENT AND ANTICIPATED FUTURE USE	CLASSIFICATION PRESENT	CLASSIFICATION FUTURE
Boston Harbor inside a line from the southerly tip of Deer Island to Boston Light House to Point Allerton in Hull except as noted below	Bathing Recreational boating Fish and wildlife propagation Fishing Shellfishing Assimilation	SC	SB
Boston Inner Harbor westerly inside a line from the southerly tip of Governor's Island to Port Independence including the Charles, Mystic and Chelsea (Creek) Rivers and Port Point Channel	Fish and wildlife propagation Fishing Industrial Processing and Cooling	SC	SC
Quincy Bay in Quincy from Bromfield Street near the Wallaston Yacht Club northerly to buoy C "1" southeasterly to the "Willows" sometimes known as Lord's Point on the northerly shore of Housha Neck in Quincy	Bathing Recreational boating Fish and wildlife propagation Fishing Shellfishing	SA	SA
Hingham Harbor in Hingham inside a line from Crows Point to World's End Promontory	Bathing Recreational boating Fish and wildlife propagation Fishing Shellfishing	SA	SA
Weymouth Fore River in Quincy and Weymouth	Recreational boating Fish and wildlife propagation Fishing Shellfishing, industrial processing and cooling	SB	SB
Weymouth Back River in Weymouth and Hingham	Recreational boating Fish and wildlife propagation Fishing Shellfishing Industrial processing and Cooling	SB	SB
Weir River in Hull and Hingham	Bathing Recreational boating Fish and wildlife propagation Fishing Shellfishing Industrial cooling and Processing	SB	SB
Neponset River in Boston, Milton and Quincy	Recreational boating Fish and wildlife propagation Fishing Shellfishing Industrial cooling and Processing	SB	SB

*Subject to the rise and fall of the tide

LOCATION	SOURCE	TYPE OF WASTE	COASTAL WATER CLASSIFICATION PRESENT	COASTAL WATER CLASSIFICATION PROPOSED	TREATMENT PRESENT	TREATMENT REQUIRED
Boston	MDC Deer Island	Sanitary (C)	SB	SB	Primary	Adequate
	MDC Nut Island	Sanitary (C)	SB	SB	Primary	Adequate
Hull	Municipal	Sanitary	SB	SA	None	Primary*

(C) Combined sewers

*To be completed by March 1972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2
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MILES
MEDFORD
EVERETT
REVERE
SOMERVILLE
CHELSEA
MYSTIC R.
CHELSEA R.
CAMBRIDGE
CHARLES R.
WINTHROP
ATLANTIC OCEAN
DEER ISLAND
BOSTON HARBOR
BROOKLINE
BOSTON
OLD HARBOR
DORCHESTER BAY
NEPONSET R.
QUINCY BAY
HINGHAM BAY
HULL
MILTON
QUINCY
HINGHAM
BRAINTREE
WEYMOUTH
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COMMONWEALTH OF MASSACHUSETTS
WATER RESOURCES COMMISSION

BOSTON HARBOR
CLASSIFICATION

WATER USE CLASSES - (SA) (SB) (SC)
— CHANGE CLASSIFICATION

INTRODUCTION

BACKGROUND

As a result of pollution of the waters overlying the shellfish growing areas in Boston Harbor, the Commonwealth of Massachusetts has issued orders prohibiting, or otherwise restricting the harvesting of shellfish for human consumption in certain areas in order to protect the public health and welfare. These restrictions are summarized below:

February 13, 1937 - Harvested shellfish from the Slate Island area of Hingham and Weymouth must receive appropriate treatment prior to consumption.

May 5, 1941 - Shellfishing prohibited in Boston Harbor, except for designated areas. As a result,

  a. Shellfishing is prohibited in approximately 1,560 acres,

  b. Shellfishing is restricted in approximately 2,432 acres, and

  c. Shellfishing is unrestricted in approximately 500 acres.

June 1, 1967 - Shellfishing prohibited in the Old Harbor area. First closure since 1941.

April 1, 1968 - Since June 1, 1967, 1,113 additional acres have been prohibited. As a result,

  a. Shellfishing is prohibited in approximately 2,673 acres,

  b. Shellfishing is restricted in approximately 1,319 acres, and

  c. Shellfishing is unrestricted in approximately 500 acres.

The only unrestricted or open areas are located along the southern shores of the Harbor. These areas are under observation by the Massachusetts Department of Public Health to determine whether or not they should also be restricted.

As provided in the Federal Water Pollution Control Act, as amended,

> "The Secretary shall also call such a conference whenever, on the basis of reports, surveys, or studies,... he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution..." "... and action of Federal, State, or local authorities."

The Secretary of the Interior has called a conference of the navigable waters of Boston Harbor.

Numerous personnel from the following agencies assisted in the collection of data or report preparation: United States Department of Health, Education, and Welfare, Public Health Service; United States Army, Corps of Engineers; Massachusetts Department of Public Health, Division of Sanitary Engineering; Massachusetts Department of Natural Resources, Division of Marine Fisheries, and Division of Water Pollution Control; Massachusetts Department of Commerce, Metropolitan Area Planning Council, Boston; and Metropolitan District Commission, Sewerage Division. The cooperation of all is gratefully acknowledged.

DESCRIPTION OF AREA

The area, as defined by the Massachusetts Department of Public Health for shellfishing purposes, is "...the waters and flats of Boston Harbor, including all its arms and tributaries, west of a line drawn from Windmill Point in Hull to the southeasterly point of Deer Island...to Point Shirley and including the shores of Lovells, Gallops and Georges Islands..." and is shown in Figure 1. These areas have been defined and established as shellfish grounds as far back as 1937 and have been periodically reevaluated. This area, known as Boston Harbor, includes Boston Inner Harbor, Boston Outer Harbor, Winthrop Harbor, Dorchester Bay, Quincy Bay, Hingham Bay and Hull Bay. It has a surface area of approximately twenty-four square miles.

Boston Harbor receives the drainage, including waste discharges, from four major coastal streams--the Mystic, Charles, Neponset and Weymouth Fore Rivers; the entire waterfront and minor tributary areas extending from Winthrop to Hull; and all of the municipalities which are part of the Metropolitan District Commission sewerage system. This area, containing 664 square miles and supporting a population of approximately 2 million, lies completely within the Commonwealth of Massachusetts. It contains forty-eight cities and towns in their entirety and significant portions of eleven others.

POPULATION AND ECONOMY

In 1965 the total population of the Boston Standard Metropolitan Statistical Area (SMSA) was 2,600,000, one-half of the state population and one-quarter of the population of New England. Although the core city of Boston declined in population from 725,000 in 1955 to 620,000 in 1965, the population of the SMSA increased 6.1 percent. The population of Massachusetts had a slightly higher percent increase in the same period, 7.4 percent. Within New England, the Boston area's role as the cultural, commercial, industrial and financial leader is unchallenged.

Employment in the area is growing at a slightly faster rate than in the state as a whole. Total employment in Massachusetts advanced 9.5 percent between 1950 and 1960, while employment in the Boston metropolitan area increased 12 percent.

Compared to the rest of the state, the employment pattern in this area is centered somewhat less on manufacturing and more on service industries, particularly insurance, education, medical services and government. Of those employed in the state, 53 percent and 35 percent are engaged in service and manufacturing activities, respectively. In the Boston SMSA, 63 percent and 29 percent of those employed are engaged in service and manufacturing activities. Manufacturing employment is concentrated mainly in electrical machinery, apparel, and food and kindred products.

The Port of Boston, with an annual total volume of over twenty million short tons of cargo, is the largest seaport in New England, both in its extent of waterfront facilities and in its volumes of waterborne trade. Boston ranks as the fourth largest seaport in the North Atlantic area after New York, Baltimore and Philadelphia. In the last decade, the Port of Boston has increased in cargo and passenger transport, but its growth has lagged in relation to other North Atlantic ports.

HYDROGRAPHY

Boston Harbor, which opens to Massachusetts Bay, is approximately twenty-four square miles in area. More than three-quarters of the harbor has a mean low water (MLW) depth of ten feet or less. Two major shipping channels serve Boston Harbor; President Roads, with an MLW depth of forty feet, and Nantasket Roads, with an MLW depth of thirty feet. There are approximately one and a half miles of effective harbor connections with Massachusetts Bay.

The maximum current velocity in the main channels is 2.0 knots, occurring near Deer Island Light three hours after the beginning of flood tide. In terms of flow and circulation, the harbor may be divided into sections. The northern section is comprised of President Roads, Dorchester Bay and Inner Harbor; the southern section is comprised of Quincy Bay, Hingham Bay and Hull Bay. In both sections the tidal fluctuation is approximately nine and a half feet.

On a volume-flow relationship, the residence time is slightly under two complete tidal cycles--approximately twenty-four hours. However, the harbor is not completely flushed out every twenty-four hours, for there are many sections where backwaters and poor circulation result in much greater residence times.

The total flow from the tributary streams ranges from 20 cfs to 1,800 cfs, averaging 350 cfs during the summer. This flow is very low compared to the daily inflow of salt water, which averages 320,000 cfs for a six-hour period.

Annual precipitation for the area averages forty-three inches. Approximately sixty-five percent of this precipitation occurs in the winter and spring.

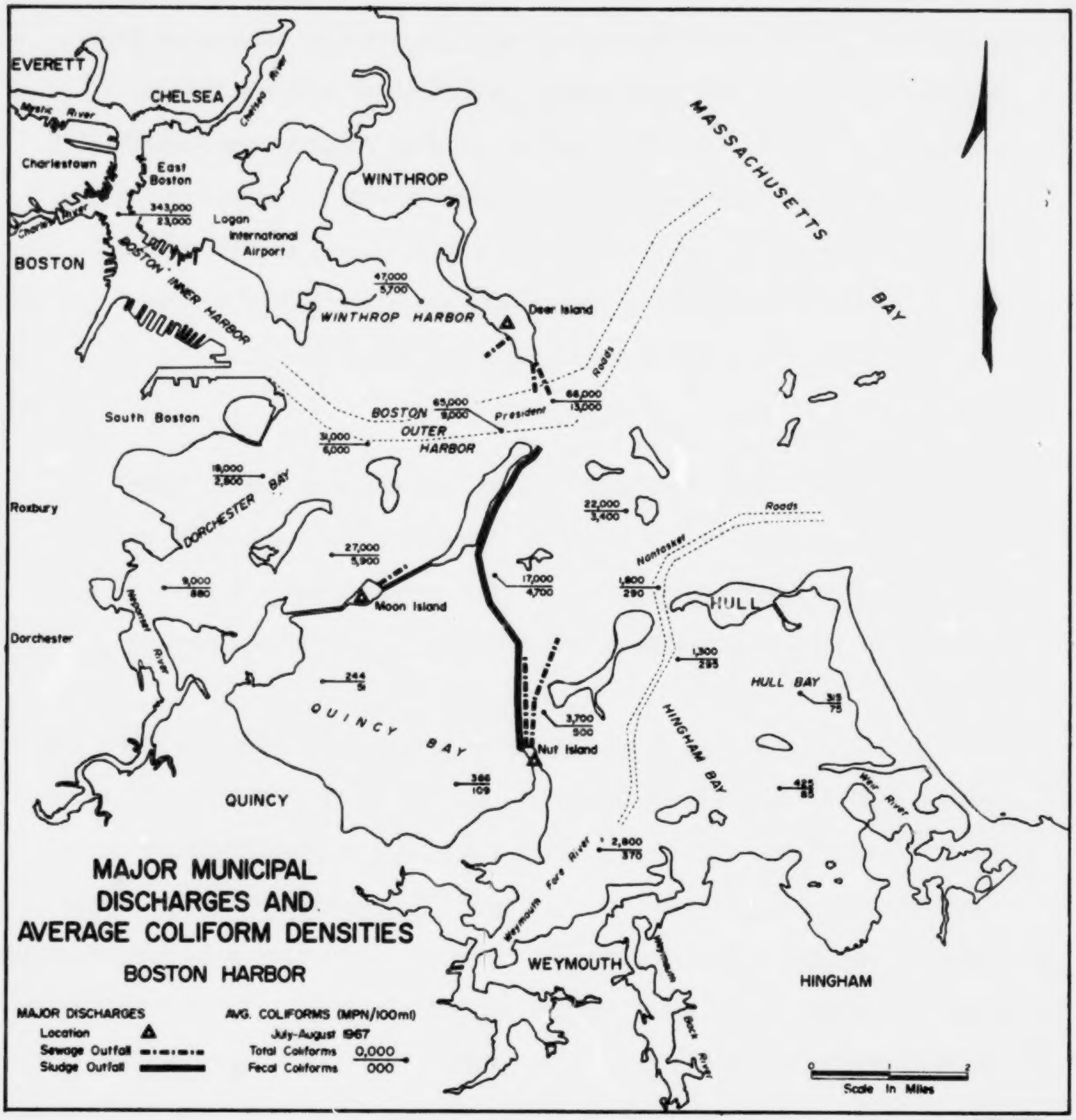
SOURCES OF POLLUTION

Boston Harbor receives the discharge of municipal wastes from 1.5 million people served by the Metropolitan District Commission (MDC) sewerage system and municipal wastes from parts of Hull and Boston. Degradation of water quality in the harbor also results from industrial waste discharges; combined sewer overflows; streams tributary to the harbor; Federal facilities discharges; watercraft wastes; debris and refuse contributed by barging operations, shoreline refuse dumping and dilapidated piers and wharves; and other sources.

MUNICIPAL WASTES

The greatest source of pollution to the waters of Boston Harbor is the discharge of municipal wastes. Approximately 460 million gallons per day (mgd) of raw or partially treated sewage from the Boston metropolitan area are discharged through two major sewerage systems operated by the MDC.

The South Metropolitan system serves twenty-two cities and towns (Table 1) and transports the waste to the Nut Island sewage treatment plant. At Nut Island, primary treatment (except for sludge disposal) with seasonal chlorination is afforded before discharge. The average volume of sewage entering the Nut Island facility is 110 mgd. Approximately 30 percent of the oxygen demanding material is removed through treatment. The treated sewage is discharged through two five-foot diameter outfalls as shown in Figure 2. One outfall, at a depth of thirty feet, extends 6,000 feet from the plant;



MAJOR MUNICIPAL DISCHARGES AND AVERAGE COLIFORM DENSITIES

BOSTON HARBOR

EVERETT
CHELSEA
Mystic River
Chelsea River
Charlestown
East Boston
Charles River
343,000
23,000
Logan International Airport
WINTHROP
BOSTON
BOSTON INNER HARBOR
47,000
5,700
WINTHROP HARBOR
Deer Island
MASSACHUSETTS BAY
Roads
65,000
9,000
BOSTON OUTER HARBOR
President
66,000
13,000
South Boston
31,000
6,000
18,000
2,800
DORCHESTER BAY
Roxbury
22,000
3,400
Roads
Nantasket
27,000
5,900
17,000
4,700
1,800
290
9,000
880
Moon Island
HULL
Dorchester
Neponset River
1,300
295
244
51
HULL BAY
315
75
QUINCY BAY
3,700
500
Nut Island
HINGHAM BAY
366
109
425
85
Weir River
QUINCY
2,800
370
Weymouth Fore River
WEYMOUTH
Weymouth Back River
HINGHAM
MAJOR DISCHARGES
Location △
Sewage Outfall
Sludge Outfall
AVG. COLIFORMS (MPN/100ml)
July-August 1967
Total Coliforms 0,000
Fecal Coliforms 000
0
1
2
Scale In Miles

FIGURE 2

TABLE 1

COMMUNITIES DISCHARGING SEWAGE TO THE METROPOLITAN DISTRICT COMMISSION SEWERAGE FACILITIES

(See Figure 1)

North Metropolitan System --

Arlington
Bedford
Belmont
Boston*
Burlington
Cambridge
Chelsea
Everett
Lexington
Malden
Medford
Melrose
Reading
Revere
Somerville
Stoneham
Wakefield
Wilmington
Winchester
Winthrop
Woburn

South Metropolitan System --

Ashland
Boston*
Braintree
Brookline
Canton
Dedham
Framingham
Hingham
Milton
Natick
Needham
Newton
Norwood
Quincy
Randolph
Stoughton
Walpole
Waltham
Watertown
Wellesley
Westwood
Weymouth

*Discharges to both systems.

the second outfall extends 1,400 feet from the plant at a depth of twenty feet. Digested sludge is discharged through a twelve-inch, 4.2 mile pipe in the President Roads area. This discharge of sludge greatly reduces the overall effectiveness of the treatment plant in terms of bacteria, oxygen demanding material, nitrogen and phosphorus removed.

Twenty metropolitan communities contribute wastes to the North Metropolitan system (Table 1). Approximately 350 mgd of sewage from this system is conveyed to Deer Island, the site of a new primary treatment plant which we understand has just become operational. The plant is designed to provide primary treatment (except for sludge disposal) or approximately 30 percent removal of the oxygen demanding material. Digested sludge and seasonally chlorinated effluent will be discharged to the harbor. The discharge of this sludge will greatly reduce the overall treatment effectiveness. Currently we understand that temporarily no sludge is being discharged with a resulting removal of 40 percent.

Sewage treated in a properly designed and operated primary treatment facility is capable of removing 30 to 35 percent of the oxygen demanding materials. However, unless the nutrients present in waste discharges are also removed, phytoplankton activity, such as that occurring in Boston Harbor, will produce oxygen depletions that will continue to endanger the aquatic life of the harbor. Adequate secondary treatment of sewage can reduce the nutrient content of the waste discharge and is capable of removing from 85 to 95 percent of the organic matter and greatly reducing the coliform bacteria. Disposal of the digested sludge into the receiving waters increased the amount of nutrients and oxygen demanding material in those waters and reduces the overall efficiency of primary or secondary treatment facilities.

The Federal Government has not granted funds to the MDC for construction of the Deer Island sewage treatment facility because of the MDC method used for the discharge of sludge.

In addition to the above major sources of municipal waste, untreated sewage is still discharged at the City of Boston's Moon Island facility. In the Town of Hull, untreated sewage is discharged at three locations within the harbor.

INDUSTRIAL WASTES

The majority of the industries in the Boston area discharge to municipal sewerage systems. Complete listings of sources of industrial waste discharging directly to the waters of Boston Harbor are not available. Partial listings are in various stages of development by Federal, State and local agencies.

COMBINED SEWER OVERFLOWS

Portions of many of the cities and towns in the Boston Harbor drainage basin have combined sewer systems. During periods of heavy rainfall, when major interceptors reach their capacity, the local sewers overflow directly into the harbor and tributary streams. In some instances, this overflow occurs during normal dry weather flow. There are more than 200 points of sewer relief in the Boston area which produce a significant bacterial, grease, solids and organic load in wet weather. Over ninety of the overflows discharge directly into the harbor.

TRIBUTARY STREAMS

The Chelsea, Mystic, Charles, Neponset and Weymouth Fore Rivers are severely degraded as they enter Boston Harbor. The Charles, Neponset and Mystic Rivers are the greatest contributors. Combined sewer overflows constitute a major source of pollution to the tributaries. Significant amounts of oil are added to the harbor from the Chelsea, Mystic and Weymouth Fore Rivers. These streams are major commercial waterways with many tank farms located along their shores.

FEDERAL INSTALLATIONS

Executive Order 11288 requires heads of Federal departments, agencies and establishments to provide leadership in the national effort to improve water quality through the prevention, control and abatement of water pollution from Federal activities in the United States. The Order requires that the Secretary of the Interior provide the necessary review, coordination and technical advice for all Federal departments, agencies and establishments. These, in turn, are required to cooperate with the Secretary, State and interstate agencies, and municipalities, insofar as practicable and consistent with the interests of the United

States and within available appropriations. Water pollution control requirements must be considered and included in the initial stages of planning for each new installation or project. Phased and orderly plans for installing water pollution abatement facilities at existing installations must be developed and periodically revised as required. The Secretary of the Interior has assigned the responsibility of implementing the Executive Order to the Federal Water Pollution Control Administration.

The Federal installations in the Boston Harbor area are listed in Table 2. Also included in this table are the present sanitary and industrial waste flows and their disposition at each installation. A brief description of the waste disposal practices of the major sources of sanitary and industrial wastes from Federal installations follows:

Boston Naval Shipyard

All sanitary wastes from the Boston Naval Shipyard (Charlestown) shore facility (average flow 0.3 mgd) are discharged to the Boston City Sanitary Sewer System. Cooling water (average flow 1.4 mgd) is discharged to Boston Harbor. Approximately 770 gallons per day of wastes from machine shop and tank cleaning operations are discharged directly to the Harbor. This discharge of industrial wastes is not in conformance with the requirements of Executive Order 11288 and corrective action is recommended.

TABLE 2

FEDERAL INSTALLATIONS--BOSTON HARBOR

NAME	AGENCY	LOCATION	QUANTITY IN G.P.D.		TREATMENT	COMMENTS
			SANITARY	INDUSTRIAL		
Boston Army Base	Army	Boston	100,000		Boston City Sewer	
Family Housing Area	Army	Winthrop	2,960		Winthrop City Sewer	
Nike Ajax Site B-36	Army	Hull	6,000		Septic tank & Chlor. Discharge to Hingham Bay	Remedial action to comply with E.O. 11288 is recommended.
Windmill Point Lifeboat Sta.	Coast Guard	Hull	640		Hull Town Sewer	
Point Allerton Sta.	Coast Guard	Hull	1,920		Hull Town Sewer	
Deer Island Light Sta.	Coast Guard	Boston	240		None	Remedial action to comply with E.O. 11288 is recommended.
Boston Station	Coast Guard	Boston	20,000		Boston City Sewer	
Base Boston	Coast Guard	Boston		18,000	None	Cooling water for machinery and dynamometer.

TABLE 2 (CONTINUED)

NAME	AGENCY	LOCATION	QUANTITY IN G.P.D.		TREATMENT	COMMENTS
			SANITARY	INDUSTRIAL		
Base Boston	Coast Guard	Boston	150		None	Two urinals on pier discharging directly to Boston Harbor. Plans are underway to eliminate.
Base Boston Vessels in Port	Coast Guard	Boston Harbor	22,000		None	Construction of a shore sewer line to collect sanitary wastes from berthed ships is scheduled for completion in late 1969 or early 1970.
Naval Hospital	Navy	Chelsea	102,500		Boston City Sewer	
Naval Shipyard	Navy	Boston	345,000		Boston City Sewer	
Naval Shipyard	Navy	Boston		1,424,000	None	Cooling water and
				770	None	wastes from machine shop and tank cleaning operations. Remedial action to comply with E.O. 11288 is rec.
South Boston Naval Annex	Navy	Boston	9,000		Boston City Sewer	
South Boston Naval Annex	Navy	Boston		342,000	Boston City Sewer	Water for generation of steam and in captive systems (hot water heating, cooling tower, etc.).

TABLE 2 (CONTINUED)

NAME	AGENCY	LOCATION	QUANTITY IN G.P.D.		TREATMENT	COMMENTS
			SANITARY	INDUSTRIAL		
Naval Shipyard & South Boston Naval Annex (Berthed Ships)	Navy	Boston Harbor	40,500		None	Remedial action to comply with E.O. 11288 is recommended.
Naval Station	Navy	Boston	49,500		Boston City Sewer	
Squantum Gardens	Navy	Squantum Point	34,800		Quincy City Sewer	
Naval Terrace	Navy	Squantum Point	10,100		Quincy City Sewer	
Boston Motor Pool	G.S.A.	Boston	400		Boston City Sewer	
U.S. Appraisers Stores	G.S.A.	Boston	5,200		Boston City Sewer	
G.S.A. Stores	G.S.A.	Hingham	2,100		Hingham Town Sewer	
Food & Drug Admin.	H.E.W.	Boston	3,600		Boston City Sewer	

South Boston Naval Annex

All sanitary wastes from the shore facility (average flow 9,000 gallons per day) are discharged to the Boston City Sanitary Sewer System. Cooling water (average flow 0.3 mgd) is discharged through the Boston City Storm Drains to Boston Harbor.

Navy Ships Berthed in Boston Harbor

The sanitary wastes from all Naval ships berthed in the Harbor are discharged without treatment. The total flow discharged varies with the sizes and numbers of ships in port but is estimated to average 40,500 gallons per day. The Navy is engaged in a program to abate pollution from its vessels, and as part of this program has installed a treatment device on board a destroyer based in Boston. This device is currently undergoing testing and evaluation. Corrective action is recommended to eliminate pollution by naval vessels.

Coast Guard's Base Boston

Sanitary wastes from two urinals located on one of the piers, all sanitary wastes from Coast Guard ships berthed at Base Boston and cooling water from the Base are discharged directly into the Harbor. All other sanitary wastes from the facility are collected by the Boston sewer system.

Plans for the removal of the urinals and for a sewer to collect sanitary wastes from berthed ships with discharge to the Boston sewer system are nearing completion. The project is scheduled for completion in late 1969 or early 1970.

Nike Ajax Site B-36 (Hull)

Six thousand gallons per day of sanitary wastes are passed through a septic tank and chlorinated before discharge to the Harbor. This is not in conformance with Executive Order 11288. Secondary treatment is recommended.

WATERCRAFT WASTES

Sewage from almost all vessels using Boston Harbor is discharged without treatment; these watercraft contribute to the pollution problem. Recreational boating activity is centered in waters also used for bathing and recreational fishing. As boating use in the harbor increases, greater pollution will result, unless steps are taken to prevent raw sewage discharges.

Approximately 80 percent of the cargo transported through the port of Boston are petroleum products. The discharge of oil and oil materials from watercraft is a serious pollution problem, whether it is an accidental spill or oily waste waters from ballast tanks, bilges or washing operations. Boston Harbor had a total of twenty-nine oil spills reported in 1966 and 1967.

DEBRIS AND REFUSE

Floating debris and refuse are esthetically unpleasant and a danger to shipping; they can also be a source of organic waste. The major cause of the debris problem in the harbor is dilapidated piers and wharves. Refuse dumped along the shore, litter contributed by vessels, and garbage spilled during barging and burning operations are the main sources of solid waste.

OTHER SOURCES

Water quality may be adversely affected by a variety of other land and water activities. For instance, urban runoff from streets and parking lots can add significant amounts of organic and suspended materials. The disturbance of bottom muds by dredging operations can result in a resuspension of accumulated organic sludges and silt and the smothering of shellfish.

The City of Boston sewerage system was constructed in the late 1800's. From past experiences in large cities, it is likely that some local sewers, for which there are no records, have never been intercepted and are presently discharging sewage directly to the harbor and tributaries.

EFFECTS OF POLLUTION ON WATER USES

SHELLFISH HARVESTING

Records at the Massachusetts Department of Natural Resources, Division of Marine Fisheries, disclosed that the commercial shellfish production from Boston Harbor and certain other areas has played a small but significant role in the economy of the shellfish industry in the Bay State. For the purpose of this report, the shellfish production is confined to the harvesting and preparation for marketing of the soft-shelled clam (Mya arenaria) available in the intertidal waters of Boston Harbor. As a result of pollution of the growing areas, most of the shellfish harvested commercially in Boston Harbor may be marketed for human consumption only after an effective method of treatment has been applied.

Official Control of Shellfish Harvesting. Commercial and private harvesting of shellfish in Boston Harbor is controlled by two means--the classification of shellfish beds by Massachusetts in order to protect the public health, and the issuance of permits by the towns to individuals for either commercial or sport digging of shellfish.

The shellfish harvest areas are defined by the State Department of Public Health as the waters and flats of Boston Harbor, including all its arms and tributaries inside of a line drawn from Windmill Point in Hull to the southeasterly point of Deer Island and through

Deer Island to Point Shirley and including the shores of Lovell, Gallops and Georges Islands. These areas have been defined and established as shellfish grounds as far back as 1937 and have continuously been redefined and surveyed. Table 3 lists the shellfish areas in Boston Harbor.

The commercial harvesting of shellfish is based on the quality of the overlying waters in the shellfish beds. Under the law, the Massachusetts Department of Public Health is held responsible for the classification of all shellfish beds through a series of sanitary and bacteriological surveys. As a cooperating member of the National Shellfish Sanitation Program for interstate shipment of shellfish, the state must also abide by Federal regulations. The coastal waters of Massachusetts, therefore, are divided into distinct bacteriological classifications in accordance with the Shellfish Sanitation Manual requirements of the National Shellfish Sanitation Program. This program is a cooperative partnership between the State, other cooperating member states and the United States Public Health Service. In general, the overlying waters of the shellfish beds are delineated under the following three bacterial classifications:

1. Approved areas: waters with a coliform median MPN (most probable number) not to exceed 70 per 100 ml. Shellfish may be harvested and sold from approved areas for direct marketing.

TABLE 3

SHELLFISH AREAS
BOSTON HARBOR

Area Harvesting Classification	City or Town	General Location	Area Code	Total Acres
Prohibited (1941 Closure)	-	**Boston Harbor**	-	**1,560**
Prohibited **(Since June 1967)**	Boston	Logan Airport, southeast	BH A	
	Boston	Logan Airport, northeast	BH B	
	Boston	Logan Airport, northwest	BH C	
	Boston	Old Harbor	BH 4	
	Boston	Pleasure Bay	BH 4A	
	Hull	Allerton Harbor	BH 13	
	Hull	Hog Island	BH 17	
	Hull	Sunset Point	BH 14*	
	Quincy	Germantown Point	BH 8B	
	Quincy	Neponset River, Squantum Point	BH 5	
	Quincy	Town River Bay	BH 8A*	
	Weymouth	Eastern Neck, Wessagusset Beach	BH 9*	
				1,113
Restricted	Boston	Orient Heights	BH D	
	Hingham	Bumpkin Island	BH 12	
	Hingham	Crow Point, west	BH 11	
	Hingham	Weymouth Back River	BH 9A	
	Hull	Sunset Point	BH 14*	
	Hull	Weir River	BH 15	
	Hull	Weir River	BH 19	
	Hull	Weir River	Weir River	
	Quincy	Hough's Neck	BH 7	
	Quincy	Hough's Neck, east	BH 8	
	Quincy	Quincy Bay	BH 6	
	Quincy	Squantum	BH 5B	
	Quincy	Town River Bay	BH 8A*	
	Weymouth	Eastern Neck, Wessagusset Beach	BH 9*	
	Weymouth	Grape Island	BH 18	
	Weymouth	Kings Cove	BH 9B	
	Weymouth	Mill Cove, east	BH 9C	
	Weymouth	State Island	BH 10	
	Weymouth	Weymouth Back River	BH 16	
	Winthrop	Point Shirley, west	BH 1	
				1,319
Approved	Hingham	Hingham Harbor	-	
	Hingham	Weir River, west	-	
	Hull	Hull Bay	-	
	Quincy	Quincy Bay	-	
				500
			TOTAL	4,492

*Indicates a partial closure. Part of the area is classified prohibited and part restricted.

2. Restricted areas: waters with a coliform median MPN not to exceed 700 per 100 ml. Shellfish may be harvested but must be treated in a State-approved depuration plant before being sold.

3. Prohibited areas: waters with a coliform median MPN that is greater than 700 per 100 ml. Shellfish may not be harvested for human consumption.

A complete statement of the classification requirements is given in Appendix A. As a result of potential contamination from sewage treatment plant effluents, certain approved areas beyond the outfall may be classified as "conditional," that is, shellfish may be harvested and sold, provided that certain specified conditions concerning the potential pollution source and other factors are met. Seasonal closures are limitations applied to specific growing areas as a result of seasonal activities such as recreational boating, shipping and seasonal chlorination practices.

There are 4,492 acres of available shellfish growing beds in Boston Harbor. In 1941, all of these beds were closed and shellfishing was prohibited with the exception of thirty-three areas covering 2,932 acres. Twenty-nine were classified as restricted; four, located in Quincy, Hull and Hingham, were open. On June 1, 1967, shellfish beds in the Old Harbor area were reclassified as prohibited. Subsequently, eleven other sections, including three partial closures, were similarly classified. As of April 1, 1968, there were the original closure areas covering 1,560 acres; twelve prohibited areas covering 1,113 acres; seventeen restricted areas covering 1,319 acres; and four approved areas covering 500 acres (see Table 3 and Figure 3). The Massachusetts Department of Public Health is currently studying the water quality over the four approved areas. Preliminary indications are that these beds are marginal.

Massachusetts law requires that all commercial shellfish harvesters register with the Department of Natural Resources, Division of Marine Fisheries, for the privilege of taking shellfish for marketing. Two types of annual permits issued for harvesting in the shellfish areas of Boston Harbor are of particular interest. One type of permit is conferred to "Master Diggers." Each Master Digger must meet the requirements of the permit and post a $500 bond. Another permit is called a "Subordinate Digger's" license which, subject to regulations, provides that the digger may labor only under the employ and supervision of a licensed Master Digger. All shellfish obtained from restricted areas, as required by law, must be properly cleansed at a state supervised depuration plant before being released for direct marketing to the consumer. To insure the safety of the product, the state has made available to the Master Diggers a shellfish treatment plant, located thirty-five miles north of Boston in Newburyport, Massachusetts, which is maintained and operated by the Division of Marine Fisheries. The cost of treating the shellfish is shared by the Master Diggers and the cities and towns from which the shellfish are obtained.

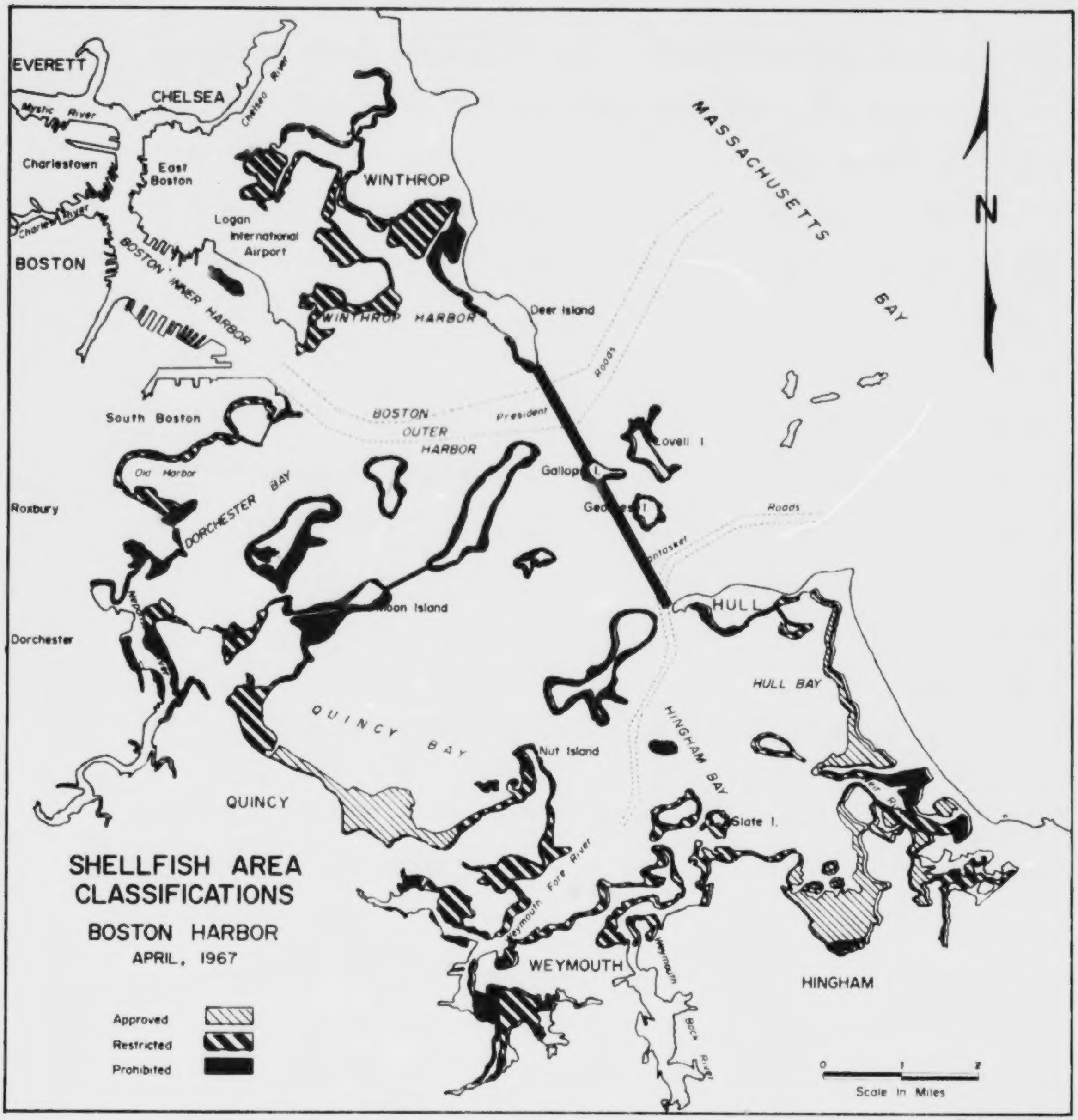

SHELLFISH AREA CLASSIFICATIONS
BOSTON HARBOR
APRIL, 1967
Approved
Restricted
Prohibited
EVERETT
CHELSEA
Mystic River
Chelsea River
Charlestown
East Boston
WINTHROP
Logan International Airport
Charles River
BOSTON
BOSTON INNER HARBOR
WINTHROP HARBOR
Deer Island
MASSACHUSETTS BAY
N
President Roads
South Boston
BOSTON OUTER HARBOR
Lovell I.
Gallops I.
Georges I.
Old Harbor
DORCHESTER BAY
Roxbury
Nantasket Roads
Moon Island
Dorchester
Neponset River
HULL
HULL BAY
QUINCY BAY
Nut Island
HINGHAM BAY
QUINCY
Slate I.
Weir River
Weymouth Fore River
WEYMOUTH
Weymouth Back River
HINGHAM
0 1 2
Scale In Miles

FIGURE 3

In an ordinary year, about twenty Master and 180 Subordinate Digger permits are issued by the Division of Marine Fisheries for the harvesting of shellfish in Boston Harbor and in other areas along the northern Massachusetts coast. Table 4 lists the number of permits issued to Master and Subordinate Diggers by individual cities and towns from 1963 to 1967.

Records of the number of harvesting permits issued for the period 1963 to 1967 showed that there was a general decline in the Subordinate Diggers group, while the Master Diggers group showed only a slight reduction in numbers. The data indicated that only 36 percent of the licensed Master Diggers and over 71 percent of the Subordinate Diggers harvested shellfish in Boston Harbor. The remaining diggers harvested in areas on the northern coast of Massachusetts. Forty-one percent of the Subordinate Diggers were licensed in Quincy and 26 percent in Boston. Quincy also had the most Master Diggers, 35 percent; Weymouth had 23 percent. The records do not tell whether the permits are used by the harvesters for full-time or part-time employment.

Production of Shellfish. The number of outlets available to the Master Diggers is estimated to be 100 wholesale dealers, 60 eating establishments and 140 retail outlets and markets. Additional outlets are located in New Hampshire. Since all of the shellfish taken out of Boston Harbor, except those dug in the few open areas, must be treated at the Newburyport shellfish treatment plant. A record of the plant's activity serves as an indicator of shellfish production in Boston Harbor.

TABLE 4

MASTER AND SUBORDINATE DIGGER PERMITS[1]
NORTHERN MASSACHUSETTS COAST

1963-1967

	1963		1964		1965		1966		1967		Avg.		Percent	
Permit Issued By	M	S	M	S	M	S	M	S	M	S	M	S	M	S
Boston Harbor														
Boston	2	39	0	51	0	50	0	0	0	29	0.4	33.8	5.9	26.5
Chelsea	0	1	0	1	0	8	0	3	0	3	0.0	3.2	0.0	2.5
Everett	0	1	0	0	0	0	0	0	0	0	0.0	0.2	0.0	0.2
Hingham	1	3	1	2	1	2	1	1	1	1	1.0	1.8	14.7	1.4
Hull	0	7	0	1	0	2	0	2	0	0	0.0	2.4	0.0	1.9
Malden	0	0	0	1	0	0	0	1	0	1	0.0	0.6	0.0	0.5
Milton	0	0	0	0	0	0	0	1	0	1	0.0	0.4	0.0	0.3
Quincy	2	58	2	58	4	61	2	42	2	47	2.4	53.2	35.3	41.8
Somerville	0	0	0	0	0	0	0	1	0	1	0.0	0.4	0.0	0.3
Weymouth	3	34	2	17	2	19	0	18	1	18	1.6	21.2	23.5	16.6
Winthrop	1	13	3	13	1	15	1	5	1	5	1.4	10.2	20.6	8.0
SUB-TOTAL	9	156	8	144	8	157	4	74	5	106	6.8	127.4	100.0	100.0
Boston Harbor	9	156	8	144	8	157	4	74	5	106	6.8	127.4	36.2	71.6
Non-Boston Harbor[2]	12	59	12	48	12	60	11	40	13	42	12.0	50.6	63.8	28.4
TOTAL	21	215	20	192	20	217	15	114	18	148	18.8	**178.0**	100.0	100.0

M=Master Digger Permit

S=Subordinate Digger Permit

1. Source: Massachusetts Division of Marine Fisheries
2. Non-Boston Harbor: Gloucester, Lynn, Newbury, Newburyport, Peabody, Revere, Rowley, Saugus and Scituate

The plant also serves six other communities. These communities, not located within the Boston Harbor area, have contributed about 18 percent of the annual amount of the shellfish processed at the plant over the past seven years, while the communities within the harbor accounted for 82 percent. Of the Boston Harbor portion, Boston and Quincy produced almost 84 percent of the total, or 69 percent of the total number of clams processed at the plant (Table 5).

The volume of shellfish treated at the Newburyport plant from 1935 through 1967 is shown in Figure 4. By dividing the twenty-eight years of record into quartiles of seven years each, the average annual rate of clam treatment and the resulting percent gain or decrease from the period 1940-1946 can be shown as follows:

Years of Record	Annual Rate of Treatment (bu.)	Est. Boston Harbor Rate (82% of Total)	Percent
1940-1946	47,100	39,000	Base Line
1947-1953	54,700	41,000	+16.1
1954-1960	37,600	31,000	-25.5
1961-1967	14,600	12,000	-66.1

A definite decrease in shellfish production is shown during the last ten years. The peak production was in 1951 when 93,700 bushels were processed, which 7.8 times the 1967 rate of 12,000 bushels. For the last seven years, the production from Boston Harbor has averaged 12,000 bushels.

Monthly processing records for the plant at Newburyport are shown in Figure 5, and indicate that 65 percent of the shellfish are treated from May to September, inclusively.

TABLE 5

GEOGRAPHICAL DISTRIBUTION OF PROCESSED CLAMS

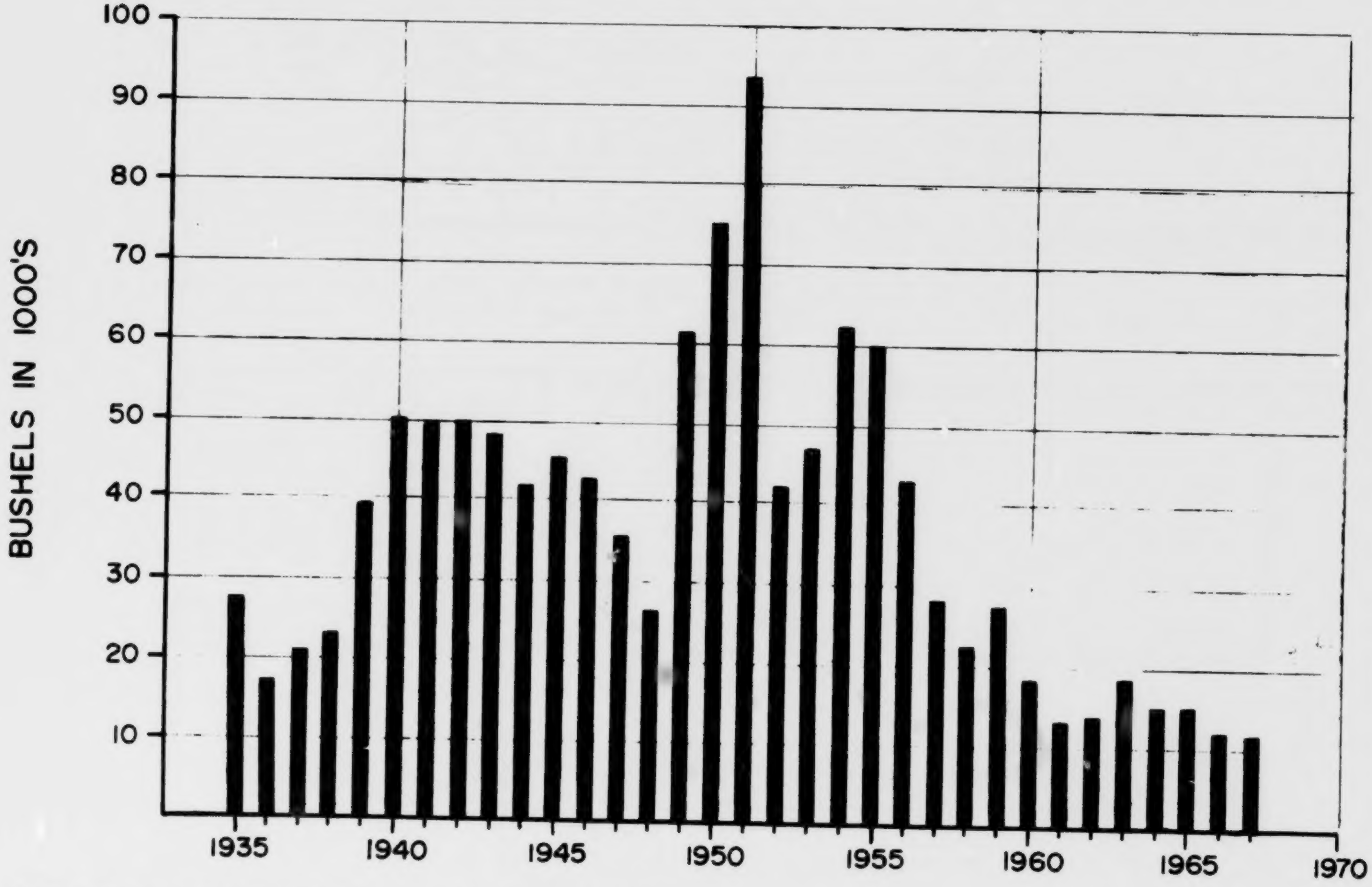
NEWBURYPORT SHELLFISH TREATMENT PLANT

1961-1967

Volume of clams in bushels

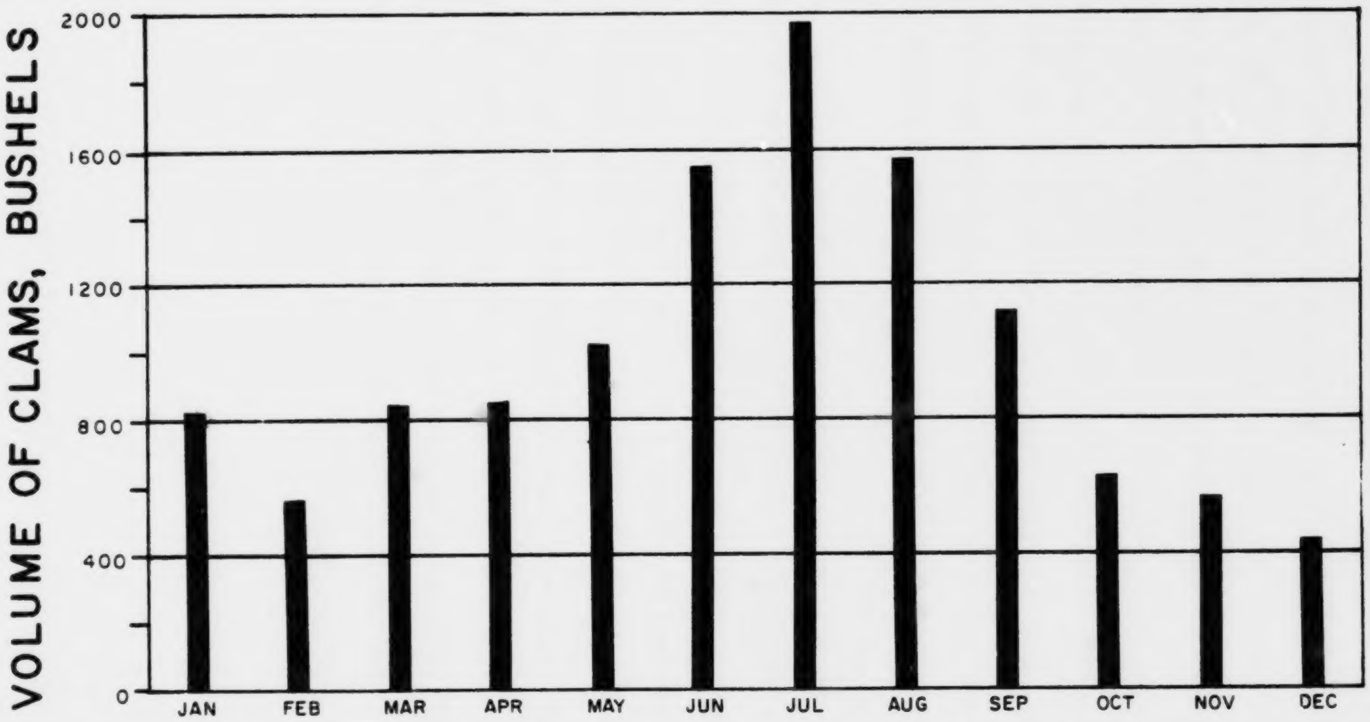
City or Town	1961	1962	1963	1964	1965	1966	1967	Total	Percent
Boston Harbor									
Boston	3,722	5,346	7,902	6,258	4,832	3,787	4,763	36,605	43.5
Hingham	437	0	315	209	154	90	113	1,318	1.5
Hull	0	718	926	381	132	131	411	2,699	3.2
Quincy	3,839	5,143	5,175	4,125	6,114	5,198	4,417	34,011	40.4
Weymouth	2,086	1,465	1,484	535	565	859	229	7,223	8.6
Winthrop	1,326	144	308	583	0	0	0	2,361	2.8
SUB-TOTAL	11,410	12,816	16,110	12,091	11,797	10,060	9,933	84,217	100.0
Boston Harbor	11,410	12,816	16,110	12,091	11,797	10,060	9,933	84,217	82.4
Non-Boston Harbor*	1,996	1,422	2,697	3,522	3,990	2,225	2,085	17,937	17.6
TOTAL	13,406	14,238	18,807	15,613	15,787	12,285	12,018	102,154	100.0

*Gloucester, Ipswich, Newbury, Newburyport, Revere and Saugus.



VOLUME OF CLAMS TREATED AT NEWBURYPORT SHELLFISH TREATMENT PLANT, 1935-1967

FIGURE 4



MONTHLY VOLUME OF CLAMS TREATED AT
NEWBURYPORT SHELLFISH TREATMENT PLANT, 1967

FIGURE 5

Economic Value of Shellfish. On the wholesale market, the shellfish are sold and delivered in 65-pound bushel units. The prices of soft-shelled clams are seasonal. During the winter months, the market demands are small; however, as warmer weather and the tourist season approach, the prices inevitably rise. Prices vary from a low of eight dollars to a high of twelve dollars per bushel. Using an annual shellfish production rate for Boston of 12,000 bushels, the rate in recent years, it can be estimated that the basic shipper market value of the shellfish at $10 a bushel would amount to $120,000 a year.

Shellfish sanitation control officials estimated that over 90 percent of the shellfish processed at the shellfish treatment plant is generally consumed as steamer clams. By allowing one quart of shellfish to a person, the annual production of treated Boston Harbor shellfish would reach well over 410,000 consumers. Of the more than 90 percent shellfish confined to the steamer market, it was estimated that 30 percent is consumed at commercial picnic clam-bakes or in restaurants and the remaining 70 percent is sold in the retail markets as shellstock over the counter.

Records of the Division of Marine Fisheries show that during the period of July 1, 1966, to June 30, 1967, 12,000 bushels of clams were treated at the Newburyport shellfish treatment plant. Eighty-two percent, or 9,900 of the 12,000 bushels were harvested from Boston Harbor. A review of Master Digger records for the same year indicates that 7,800 bushels, 79 percent, of the treated Boston Harbor shellfish were taken from the twelve areas closed by the State Department of Public Health since June 1, 1967.

The economic damage resulting from pollution caused the production loss of 7,800 bushels of shellfish, representing an annual shipper market loss of $78,000 and a general retail loss of $530,000 to $1,300,000. The result of the closure of these shellfish growing areas is summarized in Table 6.

Several factors other than the closing of shellfish beds add to the economic loss. Shellfish beds may be damaged or destroyed by dredging or landfill operations or by the toxic effects of waste discharges. Physical damage or "market refusal" may result from oil spills. The economic damage from such factors is not calculable. Should the water quality of Boston Harbor become further degraded, the State would have no choice but to impose additional limitations.

RECREATIONAL BATHING

Water, polluted by sewage, contains enormous amounts of coliform bacteria that occur typically in the excreta of warm-blooded animals.

TABLE 6

ESTIMATED ANNUAL ECONOMIC DAMAGE TO THE SHELLFISH INDUSTRY IN BOSTON HARBOR

Item	Before June 1, 1967	Amount of Loss	After April 1, 1968
No. of areas	33	9 (plus 3 partial)	21
Acreage	2,932	1,113	1,819
1967 Shellfish Production	9,800 bu (100%)	7,800 bu (79%)	2,000 bu (21%)
Landed Market Value	$98,000	$78,000	$20,000
Minimum Value to the Food Industry	$670,000	$530,000	$138,500
Maximum Value to the Food Industry	$1,670,000	$1,320,000	$350,000

Production based on year ending June 30, 1967.

These bacteria, while not usually harmful in themselves, are used as indicators of fecal pollution and of the possible presence of pathogenic bacteria. Pathogens, if ingested, can cause gastrointestinal diseases. In order to protect the public health and to maintain a high degree of water quality, the Commonwealth of Massachusetts has established a limit, based upon the presence of coliform bacteria, to differentiate between "safe" and "hazardous" swimming waters. A median total coliform value of less than 700 per 100 ml is used to classify coastal waters as SA or SB. (Pages 8, 9 and 10 contain the Massachusetts classifications.) These waters are considered to be safe for swimming and other water contact activities.

In the harbor, bacteria from human wastes constitutes a major water pollution problem. Beaches in Winthrop have been closed to bathing since 1962 as a result of bacterial pollution. Investigations have indicated that the MDC municipal waste discharge at Deer Island is the major source of bacterial pollution of the Winthrop-East Boston section of Boston Harbor. Several other bathing areas in the harbor have been threatened with closure.

In the Boston regional area the bathing beaches are overcrowded. In 1965 all of the Boston swimming areas combined could only accommodate 11,100 bathers. The number of persons on an average weekend in the summer desiring access to swimming areas will reach 49,000 by 1970.

There are ten public beaches, operated by the MDC, and several small municipal beaches in the harbor. The MDC beaches cover an area of 640 acres, including over 5.4 miles of shore.

The Metropolitan Area Planning Council has recently completed an open space and recreation study of Boston Harbor. The Council considers the harbor a major recreational center for the Boston area and recommends a program of open space acquisition and development. The recreation plan includes substantial increases in bathing and sport fishing areas and the establishment of additional boating facilities. The MAPC, however, points out, "No improvement or recreational development of the harbor is possible without an end to pollution."

RECREATIONAL BOATING

Recreational boating in the harbor has been limited by the appearance of the water. The discharge of suspended solids to the receiving waters imparts a gray turbidity to the waters. Dense growths of unsightly attached marine plants stimulated by nutrients are prevalent throughout the harbor at most buoy, pier and marine facilities. Floating debris in the harbor is esthetically unpleasing and a safety hazard, having caused damage to recreational boats.

The demand for recreational boating has increased rapidly in recent years and presently exceeds the supply of launching and mooring facilities. Within the harbor there are twenty-eight recreational boat launching facilities. In addition to trailered boats, there are approximately 5,000 pleasure boats moored in the harbor. Thirty-five private yacht clubs and thirty-two commercial marinas provide these mooring facilities.

SPORT FISHING

Sport fishing is an important water use in Boston Harbor. Surf fishing is particularly popular off the beaches of Hull, Quincy and Winthrop. Pier fishing is heavy in the South Boston area. In addition, there are several professional charter boat operators who cater to fishing parties.

ESTHETICS

Nutrients and suspended solids have caused undesirable odor problems to certain areas of Boston Harbor.

Extensive growths of sea lettuce are prevalent in three tidal flat areas of Boston Harbor, Winthrop Harbor, Squantum Bay and along the shores of Nut Island. These growths have been stimulated by very high concentrations of inorganic nitrogen and phosphorous contributed by sewage discharges. During low tide, the sea lettuce becomes exposed to air and sun and the plants decompose, producing hydrogen sulfide odors. There are reports that Winthrop Harbor residents have been forced to leave their homes to escape the smell. Hydrogen sulfide emissions from decaying sea lettuce has discolored homes. A contributory cause of the sea lettuce problem in Winthrop Bay is the nutrients added to the harbor from the Deer Island sewage treatment plant.

Upon discharge of suspended solids, the heavier solids settle to the harbor bottom in the vicinity of the points of discharge and form sludge deposits. The organic material in the sludge undergoes a decomposition which utilizes the dissolved oxygen in the overlying waters. When complete depletion of oxygen occurs, the further decomposition of organic matter produces obnoxious hydrogen sulfide gas which bubbles to the surface. Masses of the deposited sludge rise with the gas to the surface, where they appear as gray or black odorous clumps and rafts. Sludge deposits in the Fort Point Channel in South Boston are over three feet deep as a result of several combined sewer overflows. The dissolved oxygen is seriously depleted, resulting in undesirable odors from the anaerobic decomposition of the sludge.

COMMERCIAL SHIPPING

The Boston port facilities are concentrated along the Boston Inner Harbor and the Mystic, Chelsea and Weymouth Fore River areas. The main ship channel has a controlling depth of forty feet; other channels range from fifteen to forty feet.

In 1965 there were 10,574 inbound trips of commercial vessels into the harbor and 10,604 outbound trips. Passenger and dry cargo vessels constituted 54 percent of the trips, tankers constituted 24 percent and the remaining 22 percent were attributed to tugboats or or towboats. Movements of freight within the confines of the harbor numbered 14,954, of which 72, 15 and 13 percent were from passenger and dry cargo vessels, tankers and tugboats, or towboats, respectively.

WATER SUPPLY

Harbor water is used by coastal industries for cooling and processing. In 1965 several million gallons of harbor water a day were used. Over 99 percent of this total was for cooling purposes.

PRESENT WATER QUALITY

The summary of water quality parameters bacteria, dissolved oxygen, benthic life, nutrients and benthal deposits, presented in this report are based upon a survey of Boston Harbor conducted during July and August 1967 by the Federal Water Pollution Control Administration. Data obtained during the field investigations are available from two reports: "Chemical and Physical Aspects of Water Quality, Charles River and Boston Harbor, Massachusetts," February 1968; and "Biological Aspects of Water Quality, Charles River and Boston Harbor, Massachusetts," January 1968, United States Department of the Interior, Federal Water Pollution Control Administration.

BACTERIA

Water polluted by wastes from warm-blooded animals, including humans, frequently contain pathogenic bacteria. Ingestion of these pathogens by drinking polluted water or by eating raw or partially cooked shellfish grown in these waters can cause gastrointestinal diseases such as typhoid fever, dysentery and diarrhea. The infectious hepatitis virus, as well as other enteric viruses, may also be present. Body contact with water polluted by bacteria can also cause eye, ear, nose, throat or skin infections. Therefore, bacterial pollution presents a health hazard, not only to those who come in contact with polluted waters, but also to those who may eat shellfish taken from the waters.

Sewage and some industrial wastes also contain bacteria of the coliform group which typically occur in excreta or feces of warm-blooded animals and are readily detectable. Although most are harmless in themselves, coliform bacteria are always present in waters polluted by warm-blooded animal wastes and are considered indicators of the probable presence of pathogenic bacteria. The Commonwealth of Massachusetts evaluates water quality on the basis of sanitary survey findings and total coliform content. Recently, refined methods for isolation and detection of Salmonella organisms have made it practical to test for these specific pathogenic bacteria.

The coliform group usually is designated as total coliforms, and most bacterial standards are set using total coliform limits. Included in the total coliform bacteria are fecal coliforms. A separate test can be performed on a water sample to determine the number of fecal coliforms present. Since fecal coliforms can only come from warm-blooded animals, they are considered proof of fecal pollution. The results of the determinations are expressed in terms of coliforms per 100 milliliters of water. One hundred milliliters is approximately one-half cup.

The chain of disease transmission by pathogenic bacteria from human waste through shellfish which are eaten raw or insufficiently cooked, has been well established. In an attempt to control such disease transmission, the National Shellfish Sanitation Program was established in 1925. This is a cooperative program between the States, the Public

Health Service, and the shellfish industry, with the goal of safely utilizing this valuable natural resource. The Massachusetts Department of Public Health uses the guides set forth in the National Shellfish Sanitation Manual of Operations, Part I, to properly classify the suitability of estuarine waters for shellfish harvesting. The water quality standards adopted by the Massachusetts Water Resources Commission follow similar guides for the bacterial quality of Class SA, SB and SC waters. However, the water quality classifications do not necessarily mean that the shellfish beds, under the guides of the National Shellfish Sanitation Program, will be classified in the same manner. The guides are summarized below.

Shellfish Bed Classification	Water Quality Classification	Bacterial Water Quality Requirements*
Approved or Open Beds	Class SA	Coliform bacteria not to exceed a median value of 70 per 100 ml.
Restricted	Class SB	Coliform bacteria not to exceed a median value of 700 per 100 ml.
Prohibited or Closed Beds	Class SC	Coliform bacteria exceeds that of the restricted areas.

*Refer to Appendix A for the National Shellfish Sanitation Program requirements and pages 8, 9 and 10 for the Massachusetts water quality standards.

Licensed, commercial diggers, harvesting from shellfish beds classified as approved, are permitted to sell directly to the wholesale and retail market. A restricted classification requires that the harvested shellfish be treated in an approved shellfish treatment plant to remove the excess bacteria. This process of cleansing shellfish is called depuration. (For Boston Harbor the depuration facility is located in Newburyport, Massachusetts.) No harvesting of shellfish for human consumption is permitted from prohibited shellfish beds.

During the 1967 study of Boston Harbor, excessive counts of coliform bacteria were found. Total coliform counts as great as 520,000 per 100 ml were found in the Inner Harbor area. In general, very high counts were found in the northern portion of the harbor, while Quincy, Hingham and Hull Bays in the southern portion would probably meet Class SB water quality criteria for bacteria. One station in western Quincy Bay would probably satisfy the coliform standards of Class SA waters. Average total coliform concentrations found during July and August of 1967 are shown in Figure 2.

Tests for pathogenic bacteria of the genus Salmonella were conducted in Boston Harbor. Three of the five sampling swabs placed in the harbor to collect these organisms were positive for Salmonellae. Since almost all serotypes of Salmonella are known to be disease-producers in warm-blooded animals, including man, their presence in these waters is proof of a continuing health hazard.

DISSOLVED OXYGEN

The oxygen demand of sewage and industrial wastes, as measured by the biochemical oxygen demand test, indicates the waste's potential for reducing the dissolved oxygen content of the receiving water. Adequate levels of dissolved oxygen are necessary to support fish and other aquatic life. If dissolved oxygen becomes totally depleted, obnoxious odors, mostly from hydrogen sulfide gas result, causing an unpleasant environment for persons living or working nearby. The hydrogen sulfide given off may turn nearby houses, bridges or other painted structures black.

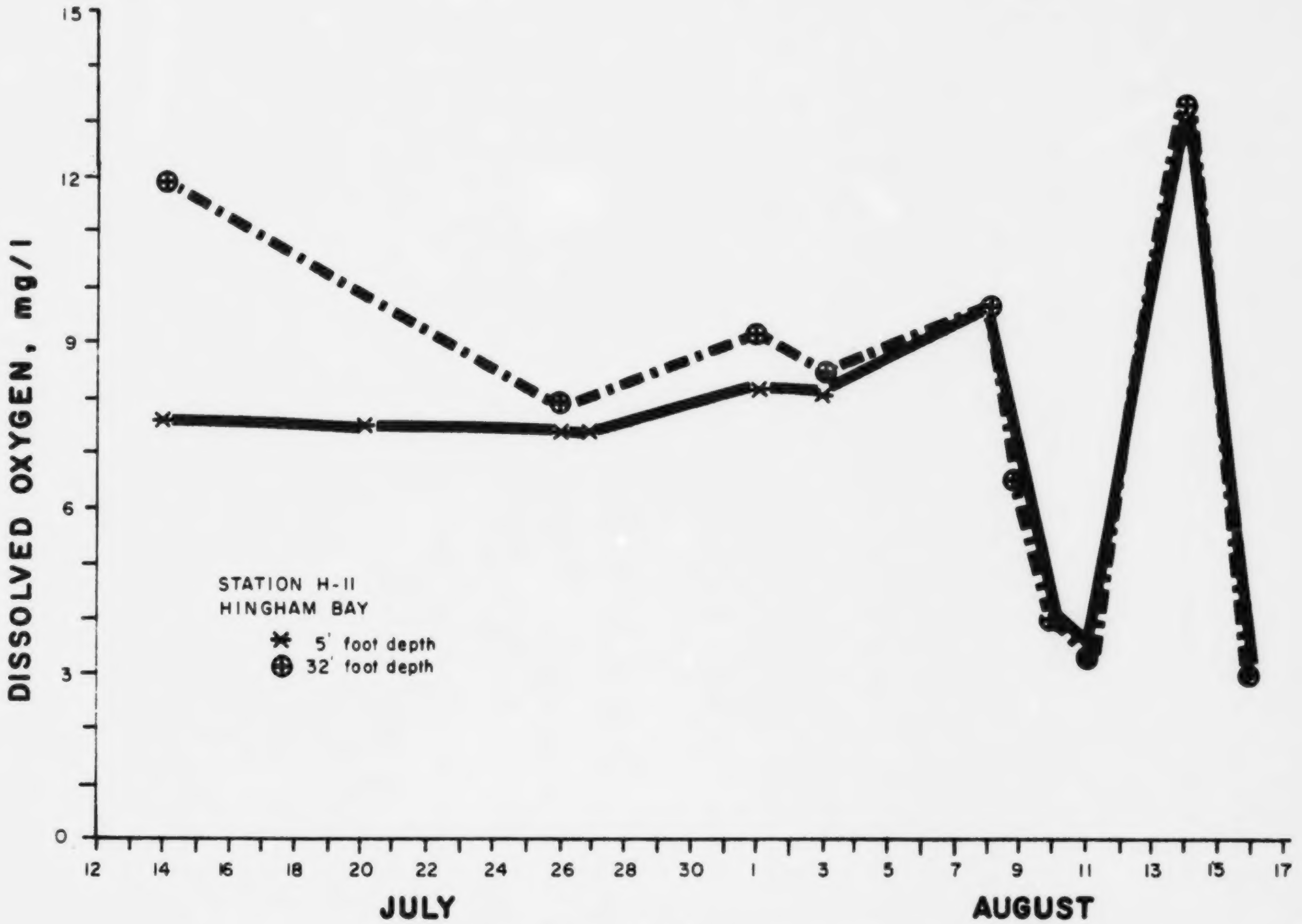
Water Quality Standards adopted by Massachusetts require that for Class SB water the dissolved oxygen be "not less than 5 mg/l at any time" and for Class SC water, the lowest classification of salt water, "not less than 5 mg/l during at least 16 hours of any 24-hour period, nor less than 3 mg/l at any time." Of the eighteen stations sampled during July and August of 1967, only six met the Class SC standard. Furthermore, only two stations met the tentative recommendations of the National Technical Advisory Committee, that "Dissolved oxygen concentrations in estuaries and tidal tributaries shall not be less than 4.0 mg/l, at any time or place..." "...for the protection of marine resources..."

Excessive phytoplankton activity is suggested by the wide fluctuation of dissolved oxygen during the latter portion of the 1967 survey (Figure 6). Under normal conditions, phytoplankton, primarily algae, produce oxygen by photosynthesis and utilize oxygen by respiration. However, when excessive nutrients and sunlight are present, the phytoplankton population can rapidly expand, resulting in high dissolved oxygen caused by an accelerated photosynthesis. During night or heavily clouded periods of daylight, the respiration of this expanding population can overtax the dissolved oxygen supply of the water, resulting in serious oxygen depletions.

BENTHIC LIFE

The benthic organism community is a convenient measure of the degree of organic pollution. If the water is not grossly polluted, the benthic population would be comprised of several kinds of organisms, each with a relatively low population. Certain clams, crabs, nematode worms, starfish, shrimp, sowbugs and mussels would normally be present. Grossly polluted areas would normally have a few kinds of organisms in great abundance. Organisms such as polychaete worms and scuds would be dominant.

All reaches of Boston Harbor and each of its tributary streams, except the inland marine reaches of the Weir and Weymouth Back Rivers, were polluted. This was evidenced by a paucity of kinds of organisms associated with benthic deposits. Polychaete worms were found in all harbor sediments: in fact, they were the only life-forms found at three stations. Scuds were also found at a majority of the sample points. These two groups of benthic organisms were dominant in kind and number over the few sowbugs, shrimp, snails, nematode worms and starfish found at the other stations. Polychaete worms were considered sufficiently common to show areas and degrees of organic over-enrichment.



DISSOLVED OXYGEN PATTERNS
BOSTON HARBOR, 1968

FIGURE 6

A density of polychaetes greater than 200 per square foot is considered indicative of excessive enrichment. This density was exceeded in all of Boston Harbor except those waters associated with the inland sectors of Quincy Bay and those seaward along a relatively narrow course through Nantasket Roads to the southern mouth of the harbor at Massachusetts Bay (Figure 7). About seven square miles, or 30 percent of the harbor inland from Massachusetts Bay, were grossly polluted based upon polychaete worm densities in excess of 200 per square foot.

NUTRIENTS

The average values of ammonia nitrogen and soluble phosphorous were equal to or greater than 100 and 40 micrograms per liter, respectively, in all areas of Boston Harbor inland from its mouth near Massachusetts Bay. Such high concentrations of nutrients caused overly enriched conditions that stimulated dense populations of phytoplankton which exceeded 1,000 per milliliter in about sixteen square miles, or 66 percent of the harbor. Areas of excessive nutrient concentrations, as indicated by phytoplankton, are shown on Figure 8.

In addition to causing excessive phytoplankton populations, the nutrients stimulated dense growths of attached marine plants. Observations throughout Boston Harbor disclosed such growths on most buoy, pier and marine facilities. Several intertidal and shallow areas of the harbor and certain reaches of Winthrop Bay supported dense growths of attached marine algae. These caused noxious conditions in Winthrop Bay, unsightly growths at marine facilities and increased maintenance costs associated with buoys and piers. In Winthrop Bay, decomposing masses of sea lettuce have caused hydrogen sulfide emissions sufficient to discolor paint on nearby dwellings.

BENTHAL DEPOSITS

Municipal and industrial wastes discharged into the receiving waters of Boston Harbor resulted in extensive deposits of decaying organic matter and incorporated oily residues covering much of the harbor bed. Oily sludge deposits in the Fort Point Channel were more than three feet deep. Hydrogen sulfide gas bubbles effervescing from the sludge in this reach, rose to the surface and burst, creating the odor of rotten eggs. Although not as deep, sludge with similar oil composition and hydrogen sulfide odor was found in several other areas.

The presence of high percentages of organic carbon and organic nitrogen is an indication of sludge deposits resulting from the discharge of municipal and industrial wastes, while sludges low in these organics may be considered inorganic, or "natural" deposits. The highest percentages of organic carbon (23.5) and organic nitrogen (1.29) associated with harbor sludges were found in the Fort Point Channel. This reach was intensively polluted and septic. Such values are similar to those associated with raw wastes from packinghouses, sewage or rapidly decomposing sludge. In samples from the remaining harbor stations, organic carbon varied from 0.4 to 5.5 percent, and organic nitrogen varied from 0.04 to 0.41 percent.

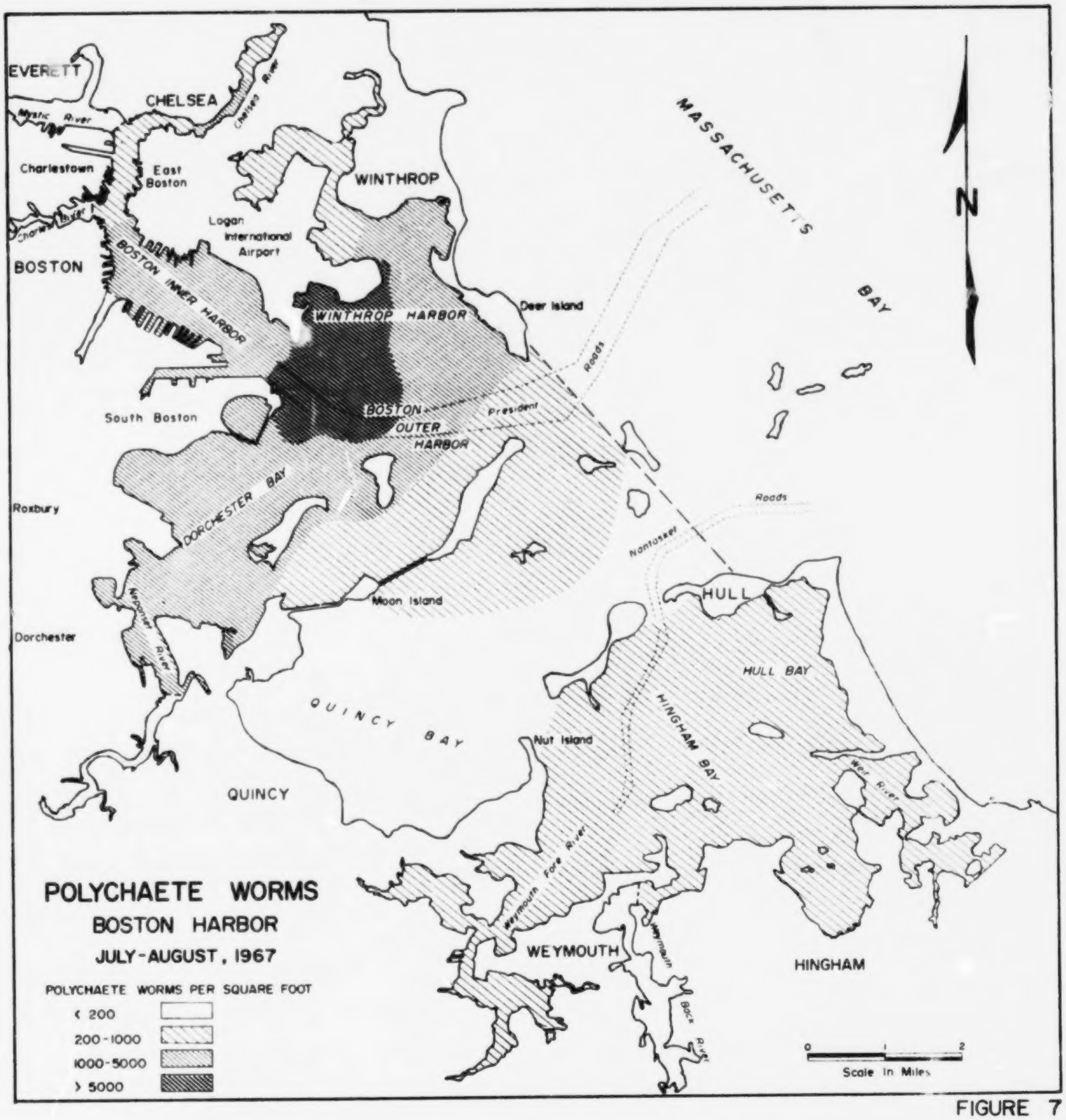

EVERETT
CHELSEA
Mystic River
Chelsea River
Charlestown
East Boston
Charles River
BOSTON
Logan International Airport
WINTHROP
MASSACHUSETTS BAY
N
BOSTON INNER HARBOR
WINTHROP HARBOR
Deer Island
Roads
President
BOSTON OUTER HARBOR
South Boston
Roxbury
DORCHESTER BAY
Dorchester
Neponset River
Moon Island
Nantasket
Roads
HULL
HULL BAY
QUINCY BAY
Nut Island
HINGHAM BAY
Weir River
QUINCY
Weymouth Fore River
WEYMOUTH
Weymouth Back River
HINGHAM
POLYCHAETE WORMS
BOSTON HARBOR
JULY-AUGUST, 1967
POLYCHAETE WORMS PER SQUARE FOOT
< 200
200-1000
1000-5000
> 5000
0
1
2
Scale in Miles

FIGURE 7

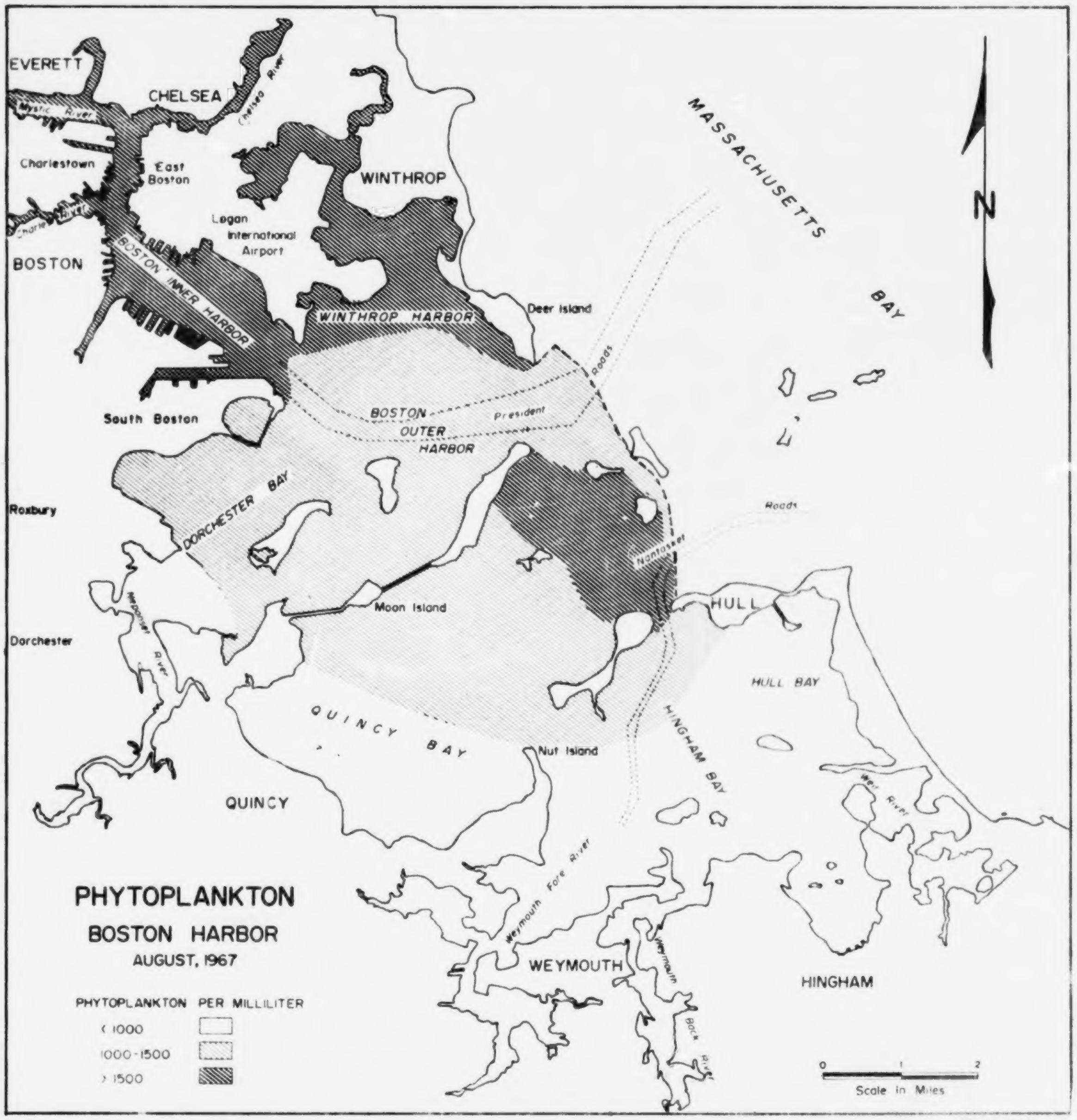

PHYTOPLANKTON
BOSTON HARBOR
AUGUST, 1967
PHYTOPLANKTON PER MILLILITER
< 1000
1000-1500
> 1500
EVERETT
CHELSEA
Mystic River
Chelsea River
Charlestown
East Boston
Charles River
WINTHROP
Logan International Airport
BOSTON
BOSTON INNER HARBOR
WINTHROP HARBOR
Deer Island
MASSACHUSETTS BAY
N
Roads
President
BOSTON OUTER HARBOR
South Boston
Roxbury
DORCHESTER BAY
Nantasket
Roads
Moon Island
HULL
Dorchester
Neponset River
HULL BAY
QUINCY BAY
Nut Island
HINGHAM BAY
QUINCY
Weir River
Weymouth Fore River
WEYMOUTH
Weymouth Back River
HINGHAM
0 1 2
Scale in Miles

FIGURE 8

SURFACE WATERS

Sewage-like solids, other assorted rejectamenta, and oily slicks also were observed in the surface waters of most portions of Boston Harbor. Such materials were abundant near the Deer Island sewer outfalls at the mouth of Boston Harbor, near Moon Island, the north end of Long Island and the inland reach of Quincy Bay.

POLLUTION CONTROL AGENCIES

Several Federal, State and local agencies, departments and organizations are presently involved in developing or implementing actions relating to the water quality of Boston Harbor. The primary State and Federal agencies and their responsibilities are briefly outlined below.

STATE AGENCIES

Metropolitan District Commission. The Metropolitan District Commission (MDC) is a regional organization, created by the Legislature, serving the Metropolitan Boston area. Through the several divisions of the MDC, the metropolitan area is served with roads, water, sewerage, parks and recreation facilities.

The Sewerage Division maintains and operates two collection systems which eventually discharge to Boston Harbor. This system serves forty-two towns or 1.5 million people. A primary sewage treatment plant at Nut Island provides primary treatment for the south sewerage system. At Deer Island a primary plant is under construction to serve the north sewerage system.

Metropolitan Area Planning Council. The Metropolitan Area Planning Council, Department of Commerce and Development, was created by the Legislature to serve as a planning agency for the 110 communities in the Metropolitan Boston area. A comprehensive plan is being developed that will include land use and sewerage, water and transportation needs.

Division of Water Pollution Control. The Division of Water Pollution Control, Department of Natural Resources, is under the direction of the Water Resources Commission. This division, which was established in September of 1966 and has primary pollution control authority over all surface waters of the Commonwealth, is directed "to enhance the quality and value of water resources and to establish a program for the prevention, control and abatement of water pollution." Under this authority, the division sets, implements and enforces water quality standards and is charged with carrying out a comprehensive plan of water pollution control.

In compliance with the Federal Water Quality Act of 1965, the Division of Water Pollution Control submitted water quality standards to the Secretary of the Interior on June 20, 1967. After review by the Department of the Interior, these standards were approved on August 10, 1967. A copy of the portion of the standards that pertains to Boston Harbor is presented in pages 8, 9 and 10.

Division of Waterways. The Division of Waterways, Department of Public Works, has been given charge of the lands, flats, shores and rights in tidal waters of the Commonwealth. This division is empowered with the general care and supervision of the harbors and tide waters. Supervisory powers are exercised over the transportation and dumping of all materials dredged from tide waters and any other material to be disposed of in these waters. The division supervises the dock-side loading of such barges and the ultimate disposal operation; however, inspectors from the Department of Natural Resources observe the transportation of these and other materials to the burning site.

Control of any building projecting into the harbor, the filling of tidelands, and the abandonment and removal of wrecks, hulks and shore structures is vested in the Department of Public Works.

State legislation provides for a five hundred dollar fine to be levied against anyone found guilty of discharging such an amount of crude petroleum or any other oils or bilge water into the waters or onto the tidal flats of the Commonwealth that it causes pollution or contamination.

Department of Public Health. The Department of Public Health is responsible for the health aspects related to water pollution. This department takes regulatory action against polluted bathing and shellfishing areas in order to maintain the public health, while the Division of Water Pollution Control is responsible for the investigation and the abatement of the pollution. To perform its role, the Department of Public Health carries out a water sampling program at the various beaches and shellfish beds in the harbor.

FEDERAL AGENCIES

Federal Water Pollution Control Administration. The Federal Water Pollution Control Administration (FWPCA), U.S. Department of the Interior, has the primary federal responsibility for pollution control as provided by the Federal Water Pollution Control Act, as amended. Programs are maintained in the areas of sewage treatment plant construction grants, enforcement, water quality standards, comprehensive programs, research and other studies and grants. Since the beginning of the aid program, the Federal Government has furnished $3.8 million to help build thirty-eight projects, costing a total of $16.6 million in the Boston Harbor area (Appendix B).

The Oil Pollution Act of 1924 is administered by the Secretary of the Interior. This responsibility has been delegated to the FWPCA.

U.S. Army Corps of Engineers. The Army Corps of Engineers, U.S. Department of Defense, under the Rivers and Harbors Act of 1899, has jurisdiction over the discharge or deposit into navigable waters of any refuse matter other than that flowing in a liquid state from streets and sewers. This jurisdiction has been exercised primarily in the interests of navigation. In addition, the Secretary of the Army has control over any structure extending into, onto or over the navigable waters of the United States.

U.S. Coast Guard. The Coast Guard, U.S. Department of Transportation, cooperates with the Department of the Interior in handling oil discharges in navigable waters and cooperates with the Army Corps of Engineers in carrying out the Rivers and Harbors Act of 1899 in cases involving interferences with navigation.

U.S. Public Health Service. The Public Health Service (PHS), U.S. Department of Health, Education and Welfare, is consulted by the FWPCA on all pollution problems affecting health over which the Public Health Service has administrative responsibility, such as shellfish growing areas, as required by the Water Quality Act of 1965. The PHS can exert pressure in shellfish sanitation through a cooperative agreement. Under the terms of this agreement, no State will accept shellfish from another State unless the shipper has a PHS approved shipper's number and the state shellfish sanitation program is endorsed by the PHS.

OTHER AGENCIES

New England River Basins Commission. The New England River Basins Commission has been established under the provisions of the Water Resources Planning Act of 1965 and is designated "...to serve as the principal agency for coordination of Federal, State, interstate, local and nongovernmental plans for the development of water and related land resources in its area..." The commission program is currently in the process of formulation.

New England Regional Commission. The New England Regional Commission was established under the Public Works and Economic Development Act of 1965 and is composed of the governors of the six New England States and a Federal co-chairman. A comprehensive economic plan with emphasis on promoting recreation, tourism and foreign trade and on the impact of water and air pollution is being developed.

APPENDICES

Appendix A.	National Shellfish Sanitation Program, Growing Area Survey and Classification
Appendix B.	Construction Grant Projects, Boston Harbor

APPENDIX A

Section C

GROWING AREA SURVEY AND CLASSIFICATION

1. Sanitary Surveys of Growing Areas.—A sanitary survey shall be made of each growing area prior to its approval by the State as a source of market shellfish or of shellfish to be used in a controlled purification or relaying operation. The sanitary quality of each area shall be reappraised at least biennially and, if necessary, a resurvey made. Ordinarily, resurveys will be much less comprehensive than the original survey since it will only be necessary to bring the original information up to date. Records of all original surveys and resurveys of growing areas shall be maintained by the State shellfish control agency, and shall be made available to Public Health Service review officers upon request.

Satisfactory compliance.—This item will be satisfied when—

a. A sanitary survey has been made of each growing area in the State prior to initial approval of interstate shipments of shellfish from that area. A comprehensive sanitary survey shall include an evaluation of all sources of actual or potential pollution on the estuary and its tributaries, and the distance of such sources from the growing areas; effectiveness and reliability of sewage treatment works; the presence of industrial wastes, pesticides, or radionuclides which would cause a public-health hazard to the consumer of the shellfish; and the effect of wind, stream flow, and tidal currents in distributing polluting materials over the growing area.[2] The thoroughness with which each element must be investigated varies greatly and will be determined by the specific conditions in each growing area.

b. The factors influencing the sanitary quality of each approved shellfish growing area are reappraised at least biennially.[3] A complete resurvey should be made of each growing area in an approved category at least once every ten years; however, data from original surveys can be used when it is clear that such information is still valid.

c. A file which contains all pertinent sanitary survey information, including the dates and results of preceding sanitary surveys is maintained by the State shellfish control agency for each classified shellfish area.

d. The State agency having primary responsibility for this element of the national program develops a system for identification of growing areas.

Public-health explanation.—The positive relationship between sewage pollution of shellfish growing areas and enteric disease has been demonstrated many times (*13*) (*14*) (*15*) (*16*) (*17*) (*18*) (*63*) (*64*) (*65*). However, epidemiological investigations of shellfish-caused disease outbreaks have never established a direct numerical correlation between the bacteriological quality of water and the degree of hazard to health. Investigations made from 1914 to 1925 by the States and the Public Health Service—a period when disease outbreaks attributable to shellfish were more prevalent—indicated that typhoid fever or other enteric disease would not ordinarily be attributed to shellfish harvested from water in which not more than 50 percent of the 1 cc. portions of water examined were positive for coliforms,[4] *provided the areas were not subject to direct contamination with small amounts of fresh sewage which would not ordinarily be revealed by the bacteriological examination.*

Following the oyster-borne typhoid outbreak during the winter of 1924-25 in the United States (*19*) the national shellfish certification program was initiated by the States, the Public Health Service, and the shellfish industry (*9*). Water quality criteria were then stated as:

a. The area is sufficiently removed from major sources of pollution so that the shellfish would not be subjected to fecal contamination in quantities which might be dangerous to the public health.

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[2] In making the sanitary survey consideration should be given to the hydrographic and geographic characteristics of the estuary, the bacteriological quality of the growing area water and bottom sediments, and the presence and location of small sources of pollution including boats, which might contribute fresh sewage to the area.

[3] The purpose of this reappraisal is to determine if there have been changes in stream flow, sewage treatment, populations, or other similar factors which might result in a change in the sanitary quality of the growing area. The amount of field work associated with such a reappraisal will depend upon the area under consideration and the magnitude of the changes which have taken place.

[4] An MPN of approximately 70 per 100 ml.

b. The area is free from pollution by even small quantities of fresh sewage. The report emphasized that bacteriological examination does not, in itself, offer conclusive proof of the sanitary quality of an area.

c. Bacteriological examination does not ordinarily show the presence of the coli-aerogenes group of bacteria in 1 cc. dilutions of growing area water.

The suitability of this three part standard for evaluating the safety of shellfish-producing areas is evidenced by the fact that no major outbreaks of typhoid fever or other enteric disease have been attributed to shellfish harvested from waters meeting the criteria since they were adopted in the United States in 1925. Similar water quality criteria have been in use in Canada with like results. The available epidemiological and laboratory evidence gives little idea as to the margin of safety, but it is probably considerable as indicated by the virtual absence of reported shellfish caused enteric disease over a comparatively long period of time (*18*) (*20*) (*21*) (*65*) (*69*) from waters meeting this criteria.

The purpose of the sanitary survey is to identify and evaluate those factors influencing the sanitary quality of a growing area and which may include sources of pollution, potential or actual; the volume of dilution water; the effects of currents, winds and tides in disseminating pollution over the growing areas; the bacterial quality of water and bottom sediments; die out of polluting bacteria in the tributaries and the estuary; bottom configuration; and salinity and turbidity of the water. Sources of pollution include municipal sewage discharged into the estuary or inflowing rivers; sewage brought into the estuary by tides or currents; surface runoff from polluted areas; industrial wastes; and discharges from pleasure craft, fishing boats, naval vessels, and merchant shipping.

Bacteriological examination of the growing waters is an important component of the sanitary survey. In many instances the bacteriological and related salinity data will also provide valuable information on the hydrographic characteristics of an area.[5] [6]

Ideally, a large number of water samples for bacteriological examination should be collected at each station. However, in most instances this is not practical because of time and budget limitations, and accordingly only a limited number of samples can be collected. Therefore, sampling stations should be chosen which will provide a maximum of data, and which will be respresentative of the bacteriological quality of water in as wide an area as possible. Sample collection should be timed to represent the most unfavorable hydrographic and pollution conditions since shellfish respond rapidly to an increase in the number of bacteria or viruses in their environment (*27*), (*28*) (*70*) (*71*) (*72*) (*78*).

There is no specified minimum number of sampling stations, frequency of sampling, or total number of samples. Sampling results obtained over a period of several years can be used as a block of data provided at least 15 samples have been collected from each of a representative number of stations along the line separating approved from restricted growing areas and there have been no adverse changes in hydrographic or sanitary conditions. Only occasional bacteriological samples are necessary from areas which are shown to be free from pollution.

Experience with the shellfish certification program indicates a tendency to omit or de-emphasize some components of the sanitary survey unless a central State file of all shellfish sanitary surveys, reappraisals, and resurveys is maintained. This is particularly true where responsibility for shellfish sanitation is divided between two or more State agencies. Maintenance of a central State file for all shellfish sanitary survey information will also simplify the endorsement appraisal of State programs by the Public Health Service and will help prevent loss of old data which may be useful in evaluating the sanitary quality of an area.

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[5] Bacteria in an unfavorable environment die out in such a way that following an initial lag period there is a large percentage decline during the first few days. Descriptions of studies on bacteria dieout have been published by Greenberg (*22*) and Pearson (*23*). Dieoff has also been investigated by the Public Health Service Shellfish Sanitation Laboratory at Woods Hole, Mass., and Pensacola, Fla. Application of this principle may be helpful in predicting the quantity of pollution which will reach an area and in establishing objective effluent quality criteria (*24*).

[6] In connection with the evaluation of sampling results, it should be noted that the MPN determination is not a precise measure of the concentration of bacteria (*4*). Thus, in repeated sampling from waters having a uniform density of bacteria varying MPN estimates will be obtained. The use of the tolerance factor 3.3 (applicable only to 5 tube decimal dilution MPN's) is one method of recognizing this variation. For example, in a body of water in which the median concentration of coliform bacteria is 70 per 100 ml., 95% of observed MPN's will be between 20 and 230 per 100 ml.; i.e., $70/3.3 = 21$ and $70 \times 3.3 = 230$

Periodic reappraisals of the sanitary quality of shellfish producing areas are necessary to determine that environmental conditions are such that the original conclusions are still valid. A *resurvey* should be made within 1 year if the *reappraisal* shows a significant detrimental change.

2. Classification of Growing Areas.—All actual and potential growing waters shall be classified as to their public health suitability for the harvesting of market shellfish. Classification criteria are described in sections C–3, C–4, C–5, C–6, and C–7 of this manual. Except in emergency any upward revision of an area classification shall be preceded by a sanitary survey, resurvey, or reappraisal. A written analysis of the data justifying the reclassification shall be made a part of the area file.

Satisfactory compliance.—This item will be satisfied when—

a. All actual and potential growing waters in the State are correctly designated with one of the following classifications on the basis of sanitary survey information: *Approved; conditionally approved; restricted;* or *prohibited.*[7] [8]

b. Area classifications are revised whenever warranted by survey data.

c. Classifications are not revised upward without at least a file review, and there is a written record of such review in the area file maintained by the State shellfish control agency.

d. All actual and potential growing areas which have not been subjected to sanitary surveys shall be automatically classified as *prohibited.*

Public-health explanation.—The probable presence or absence of pathogenic organisms in shellfish waters is of the greatest importance in deciding how shellfish obtained from an area may be used. All actual and potential growing waters should thus be classified according to the information developed in the sanitary survey. Classification should not be revised upward without careful consideration of available data. Areas should be reclassified whenever warranted by existing data. A written justification for the reclassification simplifies Public Health Service appraisal of State programs.

A hypothetical use of the four recognized area classifications is shown in figure 1. This idealized situation depicts an estuary receiving sewage from two cities, "A" and "B." City "A" has complete sewage treatment including chlorination of effluent. City "B" has no sewage treatment. The estuary has been divided into five areas, designated by roman numerals, on the basis of sanitary survey information:

Approved

Area I. The sanitary survey indicates that sewage from cities "A" and "B" (even with the "A" sewage plant not functioning) would not reach this area in such concentration as to constitute a public-health hazard. The median coliform MPN of the water is less than 70/100 ml. The sanitary quality of the area is independent of sewage treatment at city "A."

Conditionally Approved

Area II. This area is of the same sanitary quality as area I; however, the quality varies with the effectiveness of sewage treatment at city "A." This area would probably be classified *prohibited* if city "A" had not provided sewage treatment.

Restricted

Area III. Sewage from "B" reaches this area, and the median coliform MPN of water is between 70 and 700 per 100 ml. Shellfish may be used only under specified conditions .

Prohibited

Area IV. Direct harvesting from this area is prohibited because of raw sewage from "B." The median coliform MPN of water may exceed 700/100 ml.

Area V. Direct harvesting from this area is prohibited because of possible failure of the sewage treatment plant. Closure is based on need for a safety factor rather than coliform content of water or amount of dilution water.

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[7] Closures may also be based on presence of Marine Toxins or other toxic materials.

[8] States may use other terminology in describing area classifications; provided, that the classification terms used are consistent with the intent and meaning of the words "approved", "conditionally approved", "restricted", or "prohibited".

3. Approved Areas.—Growing areas may be designated as *approved* when: (*a*) the sanitary survey indicates that pathogenic microorganisms, radionuclides, and/or harmful industrial wastes do not reach the area in dangerous concentration, and (*b*) this is verified by laboratory findings whenever the sanitary survey indicates the need. Shellfish may be taken from such areas for direct marketing.

Satisfactory compliance.—This item will be satisfied when the three following criteria are met:

a. The area is not so contaminated with fecal material that consumption of the shellfish might be hazardous, and

b. The area is not so contaminated with radionuclides or industrial wastes that consumption of the shellfish might be hazardous (see section C, item 7, regarding toxins in shellfish growing areas), and

c. The coliform median MPN of the water does not exceed 70 per 100 ml., and not more than 10 percent of the samples ordinarily exceed an MPN of 230 per 100 ml. for a 5-tube decimal dilution test (or 330 per 100 ml., where the 3-tube decimal dilution test is used) in those portions of the area most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions. (Note: This concentration might be exceeded if less than 8 million cubic feet of a coliform-free dilution water are available for each population equivalent (*coliform*) of sewage reaching the area). The foregoing limits need not be applied if it can be shown by detailed study that the coliforms are not of direct fecal origin and do not indicate a public health hazard (*19*) (*20*).[8]

Public-health explanation.—A review of epidemiological investigations of disease outbreaks attributable to the consumption of raw shellfish reveals that two general situations prevail[9] insofar as pollution of growing or storage areas are concerned.

(1) Gross sewage contamination of a growing or wet storage area. (A report of a 1910 outbreak of typhoid fever involving 41 persons notes that raw sewage from a city with a population of 30,000 was discharged only a few hundred feet away from clam beds and floats (*27*) (*28*). In 1947 a case of typhoid fever was attributed to clams harvested 200 yards from the outlet of a municipal sewage treatment plant (*29*). In the latter case, the coliform MPN of the harbor water exceeded 12,000 per 100 ml. and the area had been posted as closed to shellfish harvesting.)

(2) Chance contamination of a growing or wet storage area by fresh fecal material which may not be diffused throughout the entire area (*14*) (*16*) (*17*) (*19*) and therefore not readily detectable by ordinary bacteriological procedures. The possibility of chance contamination was noted by Dr. Gurion in his report on a 1902 typhoid outbreak, and who is quoted in Public Health Bulletin No. 86, as "there is a zone of pollution established by the mere fact of the existence of a populated city upon the banks of a stream or tidal estuary which makes the laying down of oysters and clams in these waters a pernicious custom if persisted in, because it renders these articles of food dangerous at times, and always suspicious". The 1956 outbreak of infectious hepatitis in Sweden (691 cases) attributed to oysters which were contaminated in a wet storage area is an example of such contamination (*16*). Similarly in 1939, 87 cases of typhoid were attributed to fecal contamination of a storage area by a typhoid carrier (*14*).

It is well established that shellfish from water having a median coliform MPN not exceeding 70 per 100 ml.[8] *and which is also protected against chance contamination with fecal material*, will not be involved in the spread of disease which can be attributed to initial contamination of the shellfish. This is not surprising since a water MPN of 70/100 ml. is equivalent to a dilution ratio of about 8 million cubic feet of coliform-free water per day for the fecal material from each person contributing sewage to the area. This tremendous volume of water is available in shellfish growing areas through

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[8] This MPN value is based on a typical ratio of coliforms to pathogens and would not be applicable to any situation in which an abnormally large number of pathogens might be present. Consideration must also be given to the possible presence of industrial or agricultural wastes in which there is an atypical coliform to pathogen ratio (*19*).

[9] There is a third general consideration in which shellfish may be contaminated through mishandling. This is not related to growing area sanitation and is considered in part II of this manual.

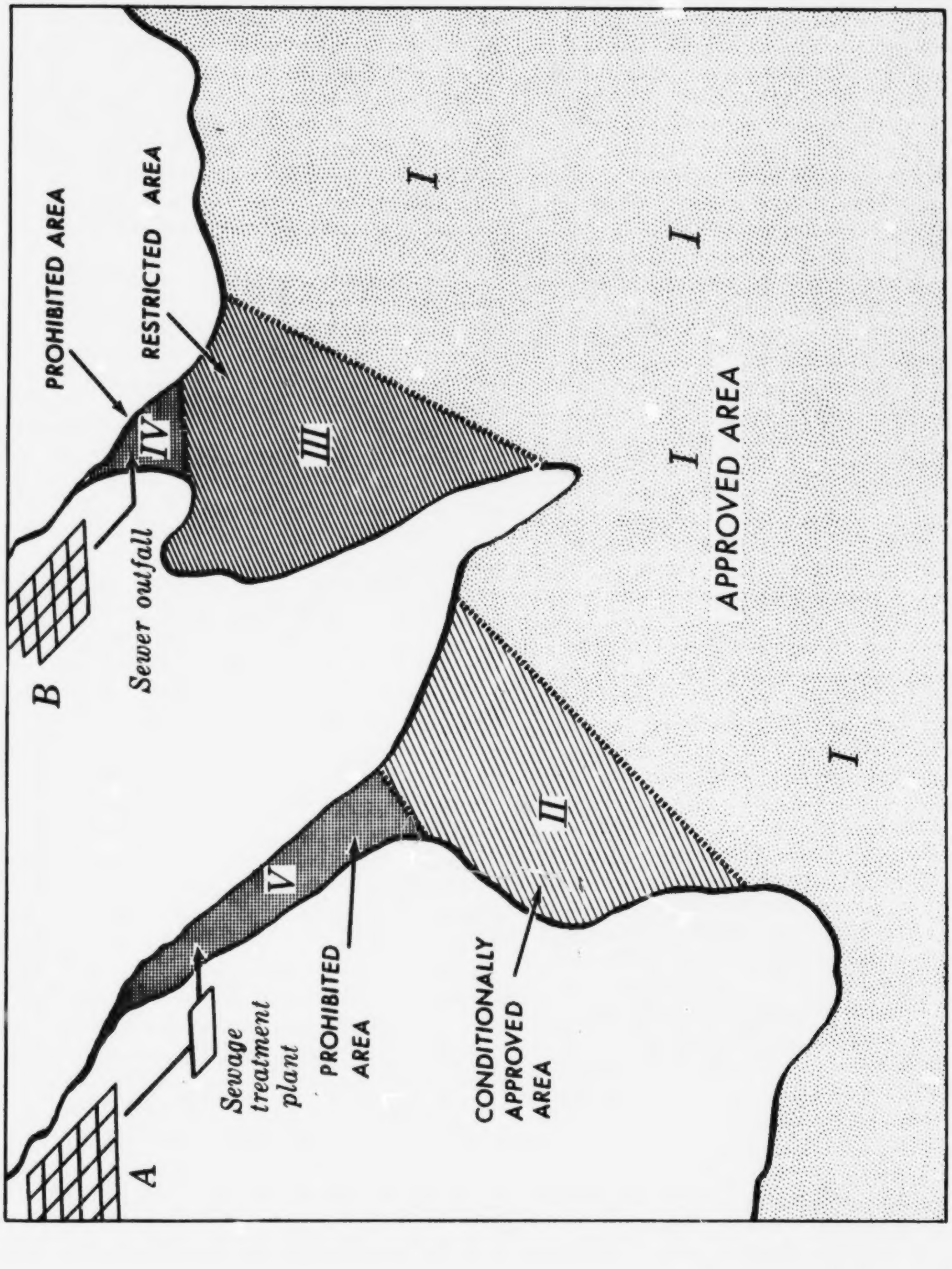
A
B
Sewage treatment plant
Sewer outfall
PROHIBITED AREA
RESTRICTED AREA
PROHIBITED AREA
CONDITIONALLY APPROVED AREA
APPROVED AREA
I
I
I
I
II
III
IV
V

FIGURE 1

tidal action which is constantly bringing unpolluted water into the area.[8]

Areas which are approved for direct market harvesting of shellfish which will be eaten raw must necessarily meet one general test; i.e, sewage reaching the growing area must be so treated, diluted, or aged that it will be of negligible public-health significance. This implies an element of time and distance to permit the mixing of the sewage or fecal material with the very large volume of diluting water and for a major portion of the microorganisms to die out. Studies of the naturai die-off of microorganisms in an unfavorable marine environment have been summarized by Greenberg (*22*).

The effectiveness of sewage treatment processes must be considered in evaluating the sanitary quality of a growing area since the bacterial and viral content of the effluent will be determined by the degree of treatment which is obtained (*2*) (*73*) (*74*) (*75*). The results of bacteriological sampling must also be correlated with sewage treatment plant operation, and evaluated in terms of the minimum treatment which can be expected with a realization of the possibility of malfunctioning, overloading, or poor operation.

The presence of radionuclides in growing area waters may also have public-health significance since shellfish, along with other marine organisms, have the ability to concentrate such materials (*31*) (*32*) (*33*) (*34*). The degree to which radioisotopes will be concentrated depends upon the species of shellfish and the specific radioisotope. For example, it has been reported that the Eastern oyster has a concentration factor of 17,000 for Zn^{65} whereas the concentration factor in soft tissues for Sr^{89} is approximately unity (*31*) (*33*). The distribution of the radioisotope in the shellfish and the biological half-life are also variable. Sources of radioactive materials include fall-out, industrial wastes, and nuclear reactors. Limiting maximum permissible concentrations of radioactive materials expressed in terms of specific radioisotopes and unidentified mixtures in water and food have been established (*35*) (*36*). The current standard should be consulted in evaluating the public-health significance of detected radioactivity in market shellfish.

The bacterial quality of active shellfish will ordinarily be directly proportional to the bacterial quality of the water in which they grow; however, considerable variation in individual determinations may be expected. The coliform MPN's of the shellfish usually exceed those of the overlying water because shellfish filter large quantities of water to obtain food, thereby concentrating the suspended bacteria. This relationship will depend upon the shellfish species, water temperature, presence of certain chemicals, and varying capabilities of the individual animals.

4. Conditionally Approved Areas.—The suitability of some areas for harvesting shellfish for direct marketing is dependent upon the attainment of an established performance standard by sewage treatment works discharging effluent, directly or indirectly, to the area. In other cases the sanitary quality of an area may be effected by seasonal population, or sporadic use of a dock or harbor facility. Such areas may be classified as *conditionally approved*.

State shellfish control agencies shall establish *conditionally approved* areas only when satisfied that (a) all necessary measures have been taken to insure that performance standards will be met, and (b) that precautions have been taken to assure that shellfish will not be marketed from the areas subsequent to any failure to meet the performance standards and before the shellfish can purify themselves of polluting microorganisms.

Satisfactory compliance.—This item will be satisfied when—

a. The water quality requirements for an *approved* area are met at all times while the area is approved as a source of shellfish for direct marketing.

b. An operating procedure for *each conditionally approved* area is developed jointly by the State shellfish control agency, local agencies, including those responsible for operation of sewerage systems, and the local shellfish industry. The operating procedure should be based on an evaluation of each of the potential sources of pollution which may affect the area. The procedure should establish performance standards, specify necessary safety devices and measures, and define inspection and check procedures. (These procedures are described in more detail in the following public-health explanation.)

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[8] See footnote 8 on page 13.

c. A closed safety zone is established between the *conditionally approved* area and the source of pollution to give the State agency time to stop shellfish harvesting if performance standards are not met.

d. Boundaries of *conditionally approved* areas are so marked as to be readily identified by harvesters.

e. Critical sewerage system units are so designed, constructed, and maintained that the chances of failure to meet the established performance standards due to mechanical failure or overloading are minimized.

f. There is a complete understanding of the purpose of the *conditionally approved* classification by all parties concerned, including the shellfish industry. Successful functioning of the concept is dependent upon the wholehearted cooperation of all interested parties. If such cooperation is not assured the State should not approve the area for direct harvesting of market shellfish.

g. Any failure to meet the performance standards is immediately reported to the State shellfish control agency by telephone or messenger. In some instances States may find it desirable to delegate the authority for closing a *conditionally approved* area to a representative of the agency located in the immediate area.

h. The State immediately closes *conditionally approved* areas to shellfish harvesting following a report that the performance standards have not been met. The area shall remain closed until the performance standards can again be met plus a length of time sufficient for the shellfish to purify themselves so that they will not be a hazard to the public health. (See section D–1, "Relaying," for information on the length of time required for self-purification of shellfish.)

i. The State shellfish control agency makes at least two evaluations during the shellfish harvesting season of each *conditionally approved* area including inspection of each critical unit of the sewerage system to determine the general mechanical condition of the equipment, the accuracy of recording devices, and the accuracy of reporting by the operating agency.

j. It is discovered that failure to meet performance standards have not been reported by the operating agency, or if the performance standards are not met, the area will immediately revert to a *restricted* or *prohibited* classification.

k. All data relating to the operation of a *conditionally approved* area, including operation of sewerage systems, are maintained in a file by the State shellfish control agency.

Public-health explanation.—The *conditionally approved* classification is designed primarily to protect shellfish growing areas in which the water quality might undergo a significant adverse change within a short period of time.[10] The change might result from overloading or mechanical failure of a sewage treatment plant, or bypassing of sewage at a lift station.

Water quality in many growing areas in the more densely populated sections of the country is, to some degree, dependent upon the operation of sewage treatment plants. For example, the boundaries of an approved shellfish area might be determined during a period when a tributary sewage treatment plant is operating at a satisfactory level. If there is some interruption in treatment it follows that there will be some degradation in water quality in the growing area, which may justify a relocation of the boundaries. The degree of relocation would depend upon such items as the distance between the pollution source and the growing area, hydrography, the amount of dilution water, and the amount of pollution.

The concept is also applicable to other situations in which there may be a rapid or seasonal change in water quality. Examples of such situations include—

a. A growing area adjacent to a resort community. During the summer months the community might have a large population which might have an adverse effect on water quality. However, during the winter when there are few people in the community the water quality might improve sufficiently to allow approval of the area. In some States this is known as a seasonal closure.

b. A protected harbor in a sparsely settled area might provide anchorage for a fishing fleet several months a year. When the fishing fleet is in, the harbor water would be of poor sanitary quality; however, during the remainder of the year the quality of the harbor water might be satisfactory. The area would be approved for shellfish harvesting only when the fishing fleet is not using the harbor.

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[10] A natural disaster may also cause many sewage treatment plants to be out of service for an extended period of time. The *conditionally approved* area concept is not ordinarily concerned with such emergency situations.

c. The water quality in an area fluctuates with the discharge of a major river. During periods of high runoff the area is polluted because of decreased flow time in the river. However, during periods of low runoff the area might be of satisfactory quality and thus be approved for shellfish harvesting.

The establishment of *conditionally approved* areas might be considered whenever the potential for sewage contamination is such that the limiting water quality criteria for an *approved* area might be exceeded in less than one week due to a failure of sewage treatment, or other situations as described above.

The first step in determining whether an area should be placed in the *conditionally approved* classification is the evaluation of the potential sources of pollution in terms of their effect on water quality in the area. Potential sources of pollution include the following:

(1) Sewage treatment plants.

(*a*) Bypassing of all or part of sewage because of mechanical or power failure, hydraulic overloading, or treatment overloading.

(*b*) Reduced degree of treatment due to operational difficulties or inadequate plant.

(2) Sewage lift stations.

(*a*) Bypassing during periods of maximum flow due to inadequate capacity.

(*b*) Bypassing because of mechanical or power failure.

(3) Interceptor sewers or underwater outfalls.

(*a*) Exfiltration due to faulty construction.

(*b*) Leakage due to damage.

(4) Other sources of pollution.

(*a*) Sewage from merchant or naval vessels.

(*b*) Sewage from recreation use of area.

The second step in establishment of a *conditionally approved* area is the evaluation of each source of pollution in terms of the water quality standards to be maintained, and the formulation of performance standards for each installation having a significant effect on the sanitary quality of the area. Examples of performance standards might include:

(1) Bacteriological quality of effluent from sewage treatment plants. This might be stated in terms of chlorine residual if the bacteriological quality of the effluent can be positively related to chlorine residual. The following is an example of a performance standard (*37*): "The median coliform MPN, in any one month, shall not exceed 500 per 100 ml., based on not less than 16 composite samples per month, and not more than 10 percent of the samples shall have an MPN in excess of 10,000 per 100 ml. Determinations of the chlorine residual of the effluent should be made hourly and recorded in the permanent plant records."

(2) Total quantity of sewage which can be discharged from any given unit, or from a combination of units, without causing the basic water quality standards to be exceeded.

(3) Amount of shipping in the area and the amount of sewage which can be expected.

Design criteria which may be useful in formulating an opinion on the quantity of sewage which can be discharged into an area without exceeding the desired water quality standards include: Population equivalent (*coliform*) of sewage; predicted survival of coliform in sea water, effectiveness of chlorination, and the total quantity of clean dilution water in an area. Results of many studies on the survival of bacteria in sea water have been summarized in *An Investigation of the Efficacy of Submarine Outfall Disposal of Sewage and Sludge;* Publication No. 14, California State Water Pollution Control Board, 1956.

The mechanical equipment at critical sewage treatment or pumping units should be such that interruptions will be minimized. Wherever possible operations should be automatically recorded on charts. Examples of the requirements which might be imposed, depending upon the importance of the unit in terms of water quality, include:

(1) Ample capacity for storm flows. (Storm water should ordinarily be excluded from the sanitary system.)

(2) Standby equipment to insure that treatment or pumping will not be interrupted because of damage to a single unit or to power failure.

(3) Instrumentation of pumps and equipment to allow the regulatory agency to determine that performance standards have been met. Examples include:

(*a*) Recording scales to indicate rate of chlorine use. Chlorine flow can be integrated with hydraulic flow to establish a ratio.

(*b*) Liquid level recording gages in overflow channels of sewage treatment plants and wet wells of lift stations to indicate when overflow takes place. Charts should be dated and initialed by the operator. Gages should be calibrated so that discharge can be estimated.

(*c*) Automatic devices to warn of failure or malfunctioning at self-operated pumping stations or treatment plants.

(4) The effect of storm sewage can be calculated by multiplying the total estimated flow by the observed coliform content. The result can be expressed in terms of population equivalents (*coliform*).

Design and operation of equipment should be such that closure provisions should not have to be invoked more than once per year under ordinary circumstances.

A closed safety area should be interposed between the *conditionally approved* area and the source of pollution. The size of such area should be based on the total time it would take for the operating agency to detect a failure, notify the State shellfish control agency, and for the latter agency to stop shellfish harvesting. It is recommended that the area be of such size that the flow time through the safety area be at least twice that required for the notification process to become effective. Due consideration should be given to the possibility that closure actions might be necessary on holidays or at night.

The type of marking which will be required for *conditionally approved* areas will vary from State to State depending upon the legal requirements for closing an area.

The length of time a *conditionally approved* area should be closed following a temporary closure will depend upon several factors including the species of shellfish, water temperature, purification rates, presence of silt or other chemicals that might interfere with the physiological activity of the shellfish, and the degree of pollution of the area. (See section D-1 of this manual for additional information on the natural purification of shellfish.)

5. Restricted Areas.—An area may be classified as *restricted* when a sanitary survey indicates a limited degree of pollution which would make it unsafe to harvest the shellfish for direct marketing. Alternatively the States may classify such areas as prohibited. (See section C-6, this manual.) Shellfish from such areas may be marketed after purifying or relaying as provided for in section D.

Satisfactory compliance.—This item will be satisfied when the following water quality criteria are met in areas designated by States as *restricted*.[11] [12]

a. The area is so contaminated with fecal materials that direct consumption of the shellfish might be hazardous, and/or

b. The area is not so contaminated with radionuclides or industrial wastes that consumption of the shellfish might be hazardous, and/or

c. The coliform median MPN of the water does not exceed 700 per 100 ml. and not more than 10 percent of the samples exceed an MPN of 2,300 per 100 ml. in those portions of the areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions. (Note: this concentration might be exceeded if less than 800,000 cubic feet of a coliform-free dilution water are available for each population equivalent (*coliform*) of sewage reaching the area.)

d. Shellfish from *restricted* areas are not marketed without controlled purification or relaying.

Public-health explanation.—In many instances it is difficult to draw a clear line of demarcation between polluted and nonpolluted areas. In such instances the State may, at its option, classify areas of intermediate sanitary quality as *restricted* and authorize the use of the shellfish for relaying, or controlled purification.

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[11] It is not mandatory that States use this classification. Areas not meeting the *approved* classification may be closed to all harvesting for direct marketing.

[12] Routine sanitary surveys and reappraisals of *restricted* areas shall be made on the same frequency as for *approved* areas. (See section C-1.)

6. Prohibited Areas.—An area shall be classified *prohibited* if the sanitary survey indicates that dangerous numbers of pathogenic microorganisms might reach an area. The taking of shellfish from such areas for direct marketing shall be prohibited. Relaying or other salvage operations shall be carefully supervised to insure against polluted shellfish entering trade channels. Actual and potential growing areas which have not been subjected to sanitary surveys shall be automatically classified as *prohibited.*

Satisfactory compliance.—This item will be satisfied when:

a. An area is classified as *prohibited* if a sanitary survey indicates either of the following degrees of pollution:

(1) The area is contaminated with radionuclides or industrial wastes that consumption of the shellfish might be hazardous and/or

(2) The median coliform MPN of the water exceeds 700 per 100 ml. or more than 10 percent of the samples have a coliform MPN in excess of 2,300 per 100 ml. (Note: This concentration might be reached if less than 800,000 cubic feet of a coliform-free dilution water are available for each population equivalent (*coliform*) of sewage reaching the area.)

b. No market shellfish are taken from *prohibited* areas except by special permit as described in section D.

c. Coastal areas in which sanitary surveys have not been made shall be automatically classified as *prohibited.*

Public-health explanation.—The positive relationship between enteric disease and the eating of raw or partially cooked shellfish has been outlined in section C–1. Prevention of the interstate transport of shellfish containing sufficient numbers of pathogenic microorganisms to cause disease is a primary objective of the National Program. Therefore, areas containing dangerous concentrations of microorganisms of fecal origin, or areas which may be slightly contaminated with fresh fecal discharges, should not be approved as a source of shellfish for direct marketing.

7. Closure of Areas Due to Shellfish Toxins.—The State shellfish control agency shall regularly collect and assay representative samples of shellfish from growing areas where shellfish toxins are likely to occur. If the paralytic shellfish poison content reaches 80 micrograms per 100 grams of the edible portions of raw shellfish meat, the area shall be closed to the taking of the species of shellfish in which the poison has been found.[13] The harvesting of shellfish from such areas shall be controlled in accord with the recommendations of sections E–1 and E–2 of this manual.

The quarantine shall remain in effect until such time as the State shellfish control agency is convinced the poison content of the shellfish involved is below the quarantine level.[14]

Satisfactory compliance.—This item will be satisfied when—

a. The State shellfish control agency collects and assays representative samples of shellfish for the presence of toxins from each suspected growing area during the harvesting season. (See section B–2 for assay methods.)

b. A quarantine is imposed against the taking of shellfish when the concentration of paralytic shellfish poison equals or exceeds 80 micrograms per 100 grams of the edible portion of raw shellfish.

Public-health explanation.—In some areas paralytic poison is collected temporarily by bivalve shellfish from free-swimming, one-celled marine plants on which these shellfish feed. The plants flourish seasonally when water conditions are favorable.

Cases of paralytic poisoning, including several fatalities, resulting from poisonous shellfish have been reported from both the Atlantic and Pacific coasts. The minimum quantity of poison which will cause intoxication in a susceptible person is not known. Epidemiological investigations of paralytic shellfish poisoning in Canada have indicated 200 to 600 micrograms of poison will produce symptoms in susceptible persons and a death has been attributed to the ingestion of a probable 480 micrograms of poison. Investigations indicate that lesser amounts of the poison have no deleterious effects on humans. Growing areas should be closed at a lower toxicity level to provide an adequate margin of safety since in many instances toxicity levels will change rapidly (*38*) (*39*). It has also been shown that the heat treatment afforded in ordinary canning processes reduces the poison content of raw shellfish considerably.

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[13] This value is based on the results of epidemiological investigations of outbreaks of paralytic shellfish poison in Canada in 1954 and 1957 (*38*) (*39*).

[14] The provisions of this item apply only to shellfish which will be marketed as a fresh or frozen product as properly controlled heat processing will reduce the poison content of the shellfish.

A review of literature and research dealing with the source of the poison, the occurrence and distribution of poisonous shellfish, physiology and toxicology, characteristics of the poison, and prevention and control of poisoning has been prepared (*40*).

In Gulf coast areas, toxicity in shellfish has been associated (*12*) (*76*) with Red Tide outbreaks caused by mass bloomings of the toxic dinoflagellate, *Gymnodinium breve*. Toxic symptons in mice suggest a type of *ciguatera* fish poisoning rather than symptoms of paralytic shellfish poisoning.

APPENDIX B

APPENDIX B

BOSTON HARBOR

FEDERAL CONSTRUCTION GRANT PROJECTS

April 1968

Project Number	Name of Applicant	Status	Description	Type	Eligible Cost	WPC Grant
102	Bedford	3	7	1	$ 185,504	$ 55,650
48	Boston, City of	3	5	1	334,560	100,368
10	Boston, MDC	3	3	1	2,136,725	250,000
30	Boston, MDC	3	3	1	930,709	250,000
40	Boston, MDC	3	1	1	1,149,253	250,000
45	Boston, MDC	3	3	1	608,144	182,443
73	Boston, MDC	3	1	3	2,672,450	250,000
161	Boston, MDC	2	1	2	2,344,963	773,830
59	Braintree	3	3	2	17,973	5,391
100	Braintree	3	3	1	426,215	127,864
110	Braintree	3	3	2	115,404	34,621
136	Braintree	3	3	2	71,941	21,582
159	Braintree	3	3	1	141,000	46,530
124	Canton	3	3	2	212,607	63,782
68	Hingham	3	4	1	105,619	31,685
126	Hingham	3	4	2	43,706	13,110
158	Hingham	1	4	1	80,900	26,697
91	Lexington	3	3	1	484,189	145,256

Boston Harbor
Construction Grants Projects
(Continued)

Project Number	Name of Applicant	Status	Description	Type	Eligible Cost	WPC Grant
142	Lexington	1	4	2	$ 166,000	$ 49,800
151	Mass., Comm. of	2	7	1	456,800	137,000
134	Milford	3	7	7	267,000	80,000
139	Millis	2	1	2	215,000	64,500
83	Needham	3	4	2	44,048	13,214
65	Norwood	3	3	2	163,482	49,044
103	Norwood	3	3	1	35,835	10,750
32	Randolph	3	3	1	888,700	250,000
132	Randolph	3	3	2	29,097	8,729
52	Wakefield	3	3	1	153,267	45,980
63	Wakefield	3	3	2	57,777	17,333
107	Wakefield	3	3	2	130,000	39,000
133	Wakefield	3	3	2	86,376	25,912
51	Westwood	3	3	1	174,698	52,410
75	Westwood	3	3	1	230,424	69,127
49	Weymouth	3	3	1	219,844	65,953
121	Weymouth	3	3	2	187,727	56,318
36	Woburn	3	3	1	96,085	28,826
38	Woburn	3	3	1	54,115	16,234
153	Woburn	2	3	2	186,200	61,440
					$16,632,436	$3,770,379

APPENDIX B (Continued)

EXPLANATORY NOTES

PROJECT NUMBER
As assigned by State agency.

NAME OF APPLICANT
As listed in the project application for each state. In multi-municipal projects, participating communities are indented under main applicant.

STATUS
Status of projects is indicated as follows:
(1) Project approved (grant offer made)
(2) Project under construction
(3) Project completed

DESCRIPTION
Description of the project as outlined in project application:
(1) Treatment Plant
(2) Outfall Sewer
(3) Intercepting Sewer
(4) Other
(5) Treatment Plant, Outfall Sewer and Intercepting Sewer
(6) Treatment Plant and Outfall Sewer
(7) Treatment Plant and Intercepting Sewer
(8) Outfall Sewer and Intercepting Sewer
(9) Waste Stabilization Ponds and Appurtenances

TYPE
Type of construction as described in the application:
(1) New
(2) Extension or Addition
(3) Remodeling and Alteration
(4) New, Extension and Remodeling
(5) New and Extension
(6) New and Remodeling
(7) Extension and Remodeling

ELIGIBLE COST
Estimated project cost in which Federal grant funds are participating.

WPC GRANT
Amount of the Federal Water Pollution Control (WPC) grant(s) offered to the applicant.

EXPLANATORY NOTES (Continued)

ELIGIBLE COST

Estimated project cost in which federal grant funds are participating.

WPC GRANT

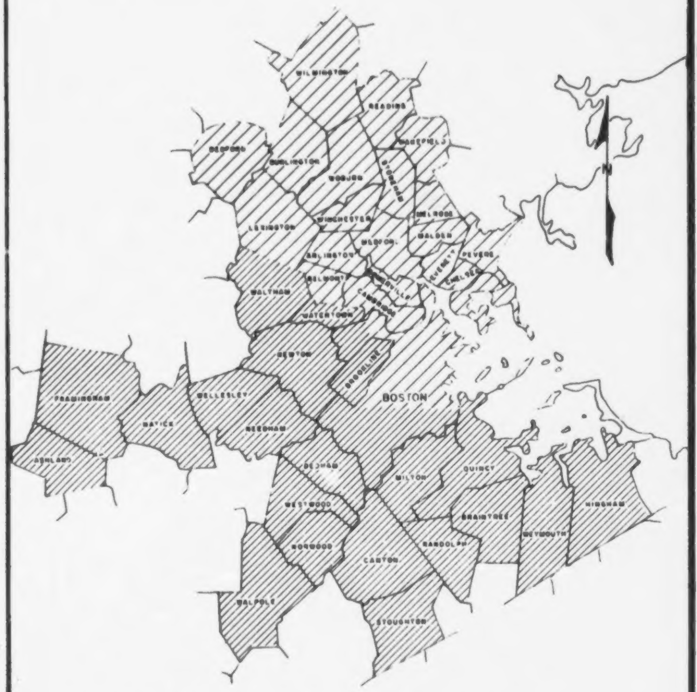
Amount of the Federal Water Pollution Control (WPC) grant(s) offered to the applicant. Blank information in this column indicates that only an Accelerated Public Works (APW) grant was made for that project.

A

MAINE
VT.
N.H.
PORTLAND
MASS.
BOSTON
CONN.
R.I.
N

STUDY AREA

METROPOLITAN DISTRICT COMMISSION


WILMINGTON
READING
WAKEFIELD
BEDFORD
BURLINGTON
WOBURN
STONEHAM
LEXINGTON
WINCHESTER
MELROSE
MEDFORD
MALDEN
ARLINGTON
EVERETT
REVERE
BELMONT
SOMERVILLE
CHELSEA
WALTHAM
CAMBRIDGE
WATERTOWN
NEWTON
BROOKLINE
FRAMINGHAM
WELLESLEY
BOSTON
NATICK
NEEDHAM
ASHLAND
DEDHAM
MILTON
QUINCY
WESTWOOD
BRAINTREE
HINGHAM
NORWOOD
RANDOLPH
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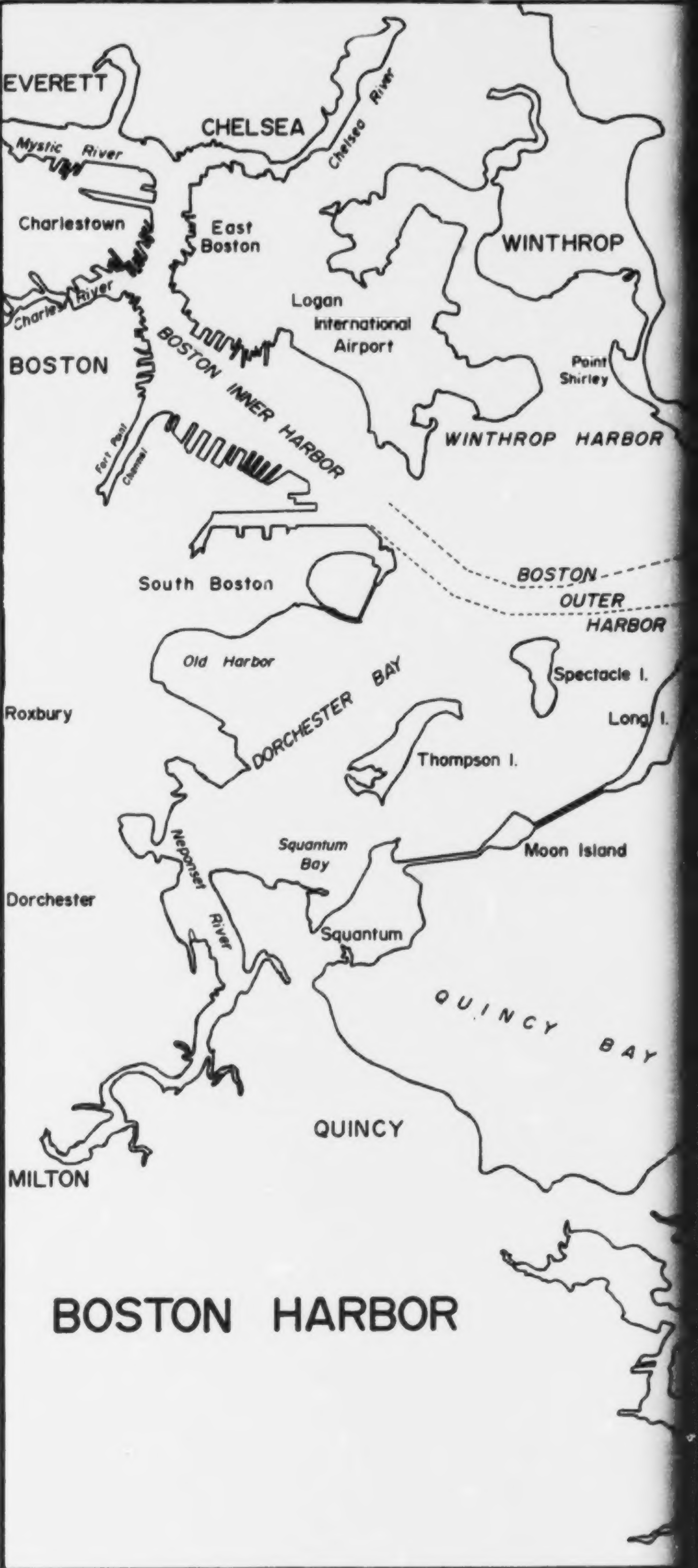
▨ — NORTH SEWERAGE SYSTEM
▨ — SOUTH SEWERAGE SYSTEM


EVERETT
CHELSEA
Mystic River
Chelsea River
Charlestown
East Boston
WINTHROP
Charles River
Logan International Airport
BOSTON
BOSTON INNER HARBOR
Point Shirley
Fort Point Channel
WINTHROP HARBOR
BOSTON OUTER HARBOR
South Boston
Old Harbor
DORCHESTER BAY
Spectacle I.
Roxbury
Long I.
Thompson I.
Neponset River
Squantum Bay
Moon Island
Dorchester
Squantum
QUINCY BAY
QUINCY
MILTON

BOSTON HARBOR

B

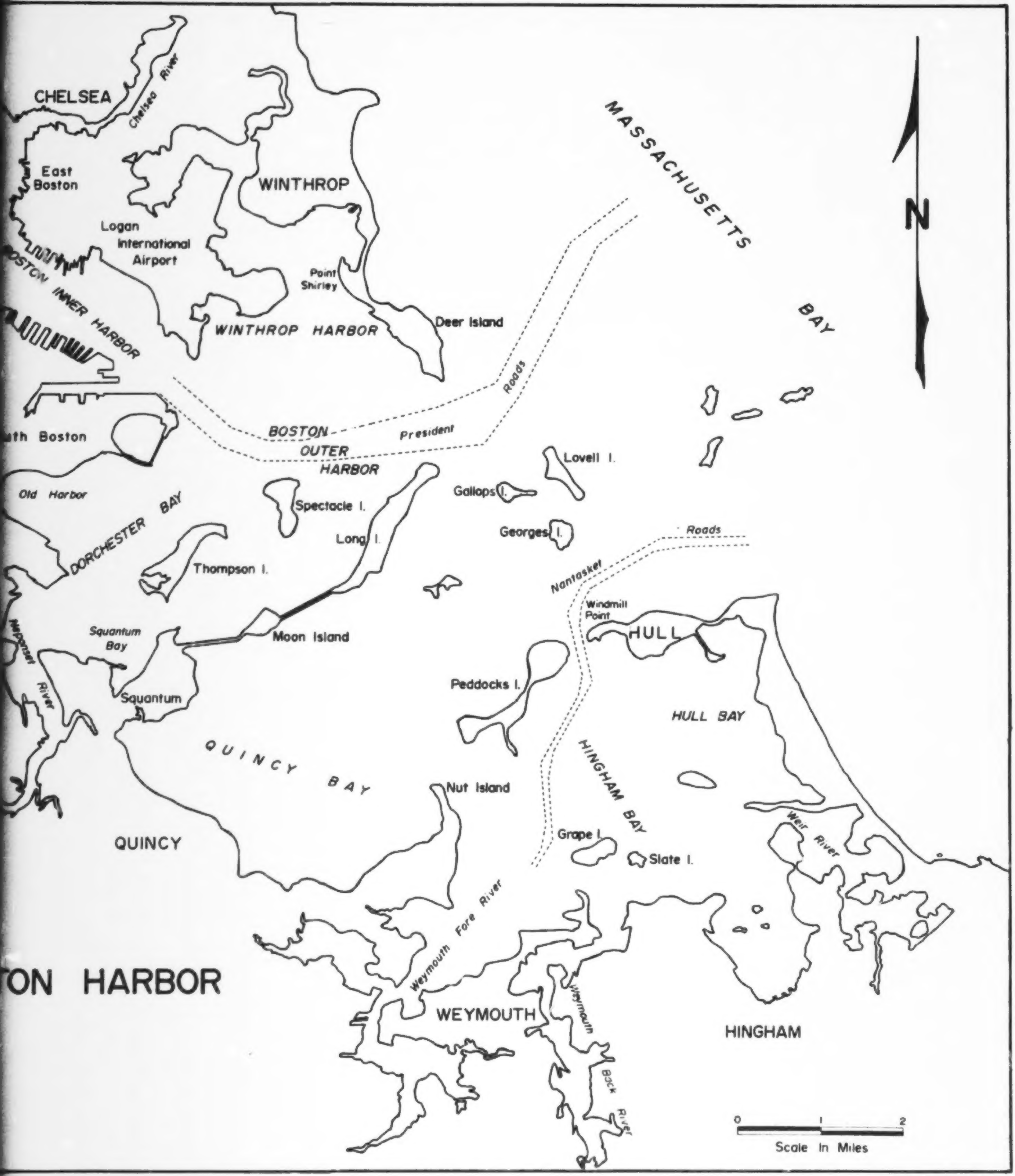

CHELSEA
Chelsea River
East Boston
Logan International Airport
WINTHROP
Point Shirley
Deer Island
BOSTON INNER HARBOR
WINTHROP HARBOR
MASSACHUSETTS BAY
N
Roads
President
BOSTON OUTER HARBOR
uth Boston
Old Harbor
DORCHESTER BAY
Lovell I.
Gallops I.
Spectacle I.
Long I.
Georges I.
Roads
Nantasket
Thompson I.
Windmill Point
HULL
Moon Island
Squantum Bay
Neponset River
Squantum
Peddocks I.
HULL BAY
QUINCY BAY
Nut Island
HINGHAM BAY
QUINCY
Grape I.
Slate I.
Weir River
Weymouth Fore River
TON HARBOR
WEYMOUTH
Weymouth Back River
HINGHAM
0 1 2
Scale In Miles

FIGURE 1

AFTERNOON SESSION

(1:00 p.m.)

CHAIRMAN STEIN: Let's reconvene. Mr. Klashman?

MR. KLASHMAN: Mr. Newman will you please continue with your statement.

MR. NEWMAN: I would like to call your attention to the section on control agencies which is presented in the report and which will not be read. I will now present the SUMMARY AND RECOMMENDATIONS of the report.

SUMMARY

As a result of pollution of the waters overlying the shellfish growing areas of Boston Harbor, the Commonwealth of Massachusetts has issued orders prohibiting or otherwise restricting the harvesting of shellfish for human consumption in certain areas in order to protect the public health and welfare. These restrictions, as of April 1, 1968, are summarized below: Shellfishing prohibited since 1941, 1,560 acres representing 35 percent of the total acreage; shellfishing prohibited since June 1, 1967, 1,113 acres representing approximately 25 percent of the acreage; shellfishing restricted, 1,319 acres representing 29 percent of the total acreage; shellfishing approved, 500 acres or 11 percent of the total acreage. The total acreage is 4,492 acres representing 100 percent of the total acreage.

Pollution in the Boston Harbor area results from the following waste discharges and activities: Municipal wastes, Metropolitan District Commission Deer Island sewage treatment plant; Metropolitan District Commission Nut Island Sewage treatment plant; city of Boston Moon Island facility; town of Hull; industrial wastes; combined sewer overflows; tributary streams; Federal installations, including the Boston Naval

Shipyard, Navy ships berthed in Boston Harbor, Coast Guard's Base Boston, Nike Ajax Site B-36 at Hull; watercraft wastes; debris and refuse.

The areas of the Harbor in Boston, Hull, Quincy and Weymouth recently closed to shellfish harvesting cover 25 percent of the available shellfishing-growing areas. These same areas accounted for 79 percent of the shellfish harvested from the harbor during the year July 1, 1966, to June 30, 1967, according to records of the Massachusetts Division of Marine Fisheries. This 79 percent or 7,800 bushels of shellfish represent a basic shipper market loss of $78,000 a year. In terms of the economic value to the food industry, the maximum annual loss is estimated to be $1.3 million.

In addition to causing the restriction of shellfish harvesting, pollution has resulted in restricted or otherwise limited recreational bathing, recreational boating and sport fishing activities and has reduced the esthetic value of the water, beaches and adjoining areas of Boston Harbor.

The predominant factor in restricting the harvesting of shellfish is the presence of coliform bacteria. Although most are harmless in themselves, coliform bacteria are always present in waters polluted by warm-blooded animal wastes and are considered indicators of the probable presence of pathogenic bacteria. During 1967, excessive coliform bacteria, as great as 520,000 per 100 ml of water, were found in the Inner Harbor area. In general, very high numbers were found in the northern section of the harbor, while Quincy, Hingham and Hull Bays in the southern portion probably satisfy the coliform standards for Massachusetts Class SB waters. Class SB waters are generally considered acceptable for water contact activities and shellfish harvesting with depuration.

Water Quality Standards adopted by Massachusetts require that for Class SB water the dissolved oxygen be "not less than 5 mg/l at any time" and for Class SC water, the lowest classification of salt water, "not less than 5 mg/l during at least 16 hours of any 24-hour period, nor less than 3 mg/l at any time." Of the eighteen stations sampled during July and August of 1967, only six met this Class SC standard.

Wide fluctuations of dissolved oxygen values occurred in Boston Harbor, apparently caused by large numbers of phytoplankton. Such fluctuations, with resulting serious oxygen depletions, are often caused by rapidly expanding phytoplankton populations in waters having very high nutrient concentrations.

The paucity of kinds of organisms associated with the benthic deposits show that all reaches of Boston Harbor and each of its tributary streams, except the inland marine reaches of the Weir and Weymouth Back Rivers, were polluted. Based upon the biological conditions about seven square miles, or 30 percent of the harbor, were grossly polluted. Chemical analysis of harbor sediments for carbon and nitrogen support the biological findings of organic enrichment. Extensive deposits, some greater than three feet deep, of decaying organic matter and incorporated oily residues covered much of the harbor.

Substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution caused by sewage, industrial waste and other waste sources discharged to the navigable waters of Boston Harbor and its tributaries, and by the action of State authorities. Accordingly, the pollution of those navigable waters is subject to abatement under procedures described in Section 10 of the Federal Water Pollution Control Act, as amended.

RECOMMENDATIONS

The following are recommendations for abating the existing water pollution and for ensuring the adequate water quality required for legitimate water uses including shellfish harvesting of Boston Harbor. These recommendations are designed for the present conditions. Any basic alteration in the harbor's condition, either natural or caused by man, may necessitate a review of the requirements.

1. All waters in Boston Harbor shall meet the water quality standards, including the implementation and construction schedules, submitted by the Commonwealth of Massachusetts and approved by the Secretary of the Interior. These standards are at the end of this recommendations section.

2. a. The Deer Island sewage treatment facility shall be fully staffed and operation continued.

b. A technical committee shall be established to determine if the standards of water quality are being met. The committee shall report its findings to the conferees in six months.

c. An evaluation of the effect of the treated discharges of both the Deer Island and Nut Island facilities on the harbor waters shall be completed as soon as possible. If needed, a survey should be undertaken to determine what additional pollution abatement measures are necessary.

d. The evaluations and studies shall also consider the need for discharging all wastes, including dry weather flows and combined sewer overflows, to waters other than those of Boston Harbor.

e. A proposed plan to accomplish any additional measures shall be reported to the conferees by June 1969.

3. a. The city of Boston shall formulate and implement the complete phasing out of the Moon Island facility.

b. As an interim measure, continuous disinfection of all discharges from Moon Island, in accordance with orders established by the Massachusetts Division of Water Pollution Control, shall be provided.

4. a. Appropriate local, State and Federal agencies shall adequately control the dumping of garbage or refuse along the shores and in the waters of the harbor.

b. Material in existing dump sites, sunken vessels, dilapidated piers, wharves and other structures and other sources and sites of debris and rubbish shall be removed and the appearnace of the bank restored to an esthetically acceptable condition.

5. The problem of pollution from vessels in Boston Harbor is serious. A technical committee,including State and Federal representatives, shall be established to consider the vessel pollution problem and provide the conferees with recommendations in six months.

6. Industry and local, State and Federal agencies shall complete and implement contingency plans for the most appropriate and effective methods of preventing and handling oil pollution.

7. All municipalities, industries and the Metropolitan District Commission shall continue immediate remedial action, including repair or replacement,as needed,of all storm overflow structures and tide gates to eliminate backflow from the harbor and its tributaries into the sewerage system.

8. All Federal facilities shall construct and operate treatment facilities required by Executive Order 11288.

These are the conclusions and the recommended-action program. Mr. Chairman, I would like to introduce reports on several studies into the record but not for the transcript. They are "Chemical and Physical Aspects of Water Quality, Charles River and Boston Harbor, Massachusetts," by FWPCA; "Biological Aspects of Water Quality, Charles River and Boston Harbor, Massachusetts," by FWPCA, January 1968; "Summary of Water Quality Evaluation of Boston Harbor and Tributaries," by FWPCA and an article entitled "The Sea Lettuce Problem in Boston Harbor," by Doctor Clair N. Sawyer.

MR. KLASHMAN: Where does that article appear?

MR. NEWMAN: The Journal of Water Pollution Control Federation, August 1965, pages 1122 to 1133. Mr. Chairman, conferees, that concludes our presentation.

CHAIRMAN STEIN: All right. Without objection these four documents will be included as exhibits but not as part of the record and will be available for examination at the Regional Headquarters during normal business hours. Are there any comments or questions? (the above-mentioned Exhibits 1-4, respectively, are on file in the FWPCA Northeast Regional Office.)

MR. KLASHMAN: Mr. Newman, may I ask you a couple of questions? Does the MDC sewerage system have infiltration?

MR. NEWMAN: Yes, there is considerable infiltration into the system, particularly at high tide, and also due to ground water infiltration.

MR. KLASHMAN: Is this problem of infliltration common with sewerage systems throughout the country?

MR. NEWMAN: Very definitely. Particularly where the sewer is located adjacent to a river or stream.

MR. KLASHMAN: Well then, this problem of the MDC is not unusual, is it?

MR. NEWMAN: It is not unusual except that it is excessive at the time when the tide is high and the infiltration exceeds that which is normal to a sewerage system.

MR. KLASHMAN: When the infiltration enters the sewerage system, does it become mixed with sewage already in the pipe?

MR. NEWMAN: Yes, it does, generally.

MR. KLASHMAN: There is no way to keep the liquids apart?

MR. NEWMAN: No, there is not unless one is salt water and the other one is fresh.

MR. KLASHMAN: Then would you say that the infiltration water becomes sewage?

MR. NEWMAN: Yes.

MR. KLASHMAN: Thank you, Mr. Newman, no other questions.

CHAIRMAN STEIN: Are there any other comments or questions?

MR. YASI: Mr. Newman, I refer you to page 18 of the report, please, the first paragraph on Federal installations. Is there a plan of implementation, and, if there is, may it be made available to the State Water Pollution Control Agency?

MR. NEWMAN: I would like to call on Mr. Edward Conley who can answer that.

MR. YASI: Thank you.

MR. KLASHMAN: Mr. Conley, apparently, has stepped out briefly. Do you mind, Mr. Yasi, if we come back to Mr. Conley? I think it is a very pertinent and important question, and I would like very much to have him answer this for you in detail. If we can defer that I am sure he will be back very shortly.

MR. YASI: Surely. Thank you.

CHAIRMAN STEIN: Are there any further questions? If you are going to find your colleague Mr. Conley, I would recommend that you suggest he come in here with recommendations specifically about the Federal installations and precisely what has to be done and the recommended date. All right. Mr. Klashman?

MR. KLASHMAN: I would like to now call on Mr. Mark Abelson, Regional Coordinator for the Department of the Interior. Mr. Abelson?

MARK ABELSON, NORTHEAST REGIONAL
COORDINATOR, U. S. DEPARTMENT OF
THE INTERIOR, BOSTON, MASSACHUSETTS

MR. ABELSON: Mr. Chairman, conferees, ladies and gentlemen, I am Mark Abelson, Regional Coordinator for the Northeast Region, United States Department of the Interior.

The Department of the Interior is the Nation's primary agency charged with responsibility for a wide variety of programs for the management, conservation and development of the natural resources which benefit every section of the Nation. For this reason, it can best be described as a Department of Natural Resources.

The Department is made up of some three dozen Bureaus and Offices whose function and responsibilities cover the entire range of natural and human resources. In the Northeast, coordination of these functions and responsibilities is accomplished through my office in Boston.

In carrying out these vital responsibilities for sound management of natural resources, the Department encourages efficient resource use; works to assure that a sound resource base is provided to meet the needs of our expanding economy, our national security and our future generations: promotes an equitable distribution of benefits from nationally-owned resources and seeks to prevent wasteful exploitation of resources.

The Department has a definite interest in all waters of the country and in the entire pollution problem.

Water and its associated opportunities and problems ignore State, regional and international boundaries. It is important that the interrelationships of water be so recognized and that the efforts of all concerned plan for the best use of this valuable resource.

The focus of the efforts of the Department of the Interior is directed to the maintenance of adequate national water supplies and adequate water quality for whatever uses man may wish to make of this resource. The Interior approach emphasizes the coordination and interrelation between uses and the effect of these uses on management and the quality of the total water supply system. We hope we can make it possible for the country to remain as an affluent not effluent society.

Mark Abelson

Maintenance of water quality involves not only the quality levels of human consumption but also quality levels for consumption by other animal and plant life for development of other natural resources and for industrial processes. These quality considerations are interrelated. They can be understood and controlled best from the point of view of water as a resource rather than from the point of view of a particular quality need.

All waters in rivers, lakes, bays and estuaries should be as clean as possible, not as unclean as admissible. In handling water problems over a period of years the Department has accumulated a great deal of experience. It has the facilities and the qualified manpower to deal with a wide variety of water problems. The broad interests of the Department in water quality and related problems in the Boston Harbor area and the estuary are reflected in the Department agencies, which include the Federal Water Pollution Control Administration. While each of these agencies has its own program, the Department exercises the the administration necessary to assure that all programs are coordinated to achieve the best overall results.

Interior Bureaus, in addition to the Federal Water Pollution Control Administration, carry on water quality studies related to the physical, chemical and biological adequacy of our water resources. These studies and the associated research are chiefly those in which the skills and required knowledge are based on geology, chemistry, hydrology, engineering and other physical science aspects of water management. Interior's water quality research extends beyond water supply to the study of environments adequate for the propagation, production and control of both fish and wildlife resources and for water-based recreation.

In common with many others the Department of the Interior has interests and responsibilities in the economic and social aspects of water quality management. We recognize that such factors as quantitative requirements, competitive uses and marketability of water and associated products must be given consideration in all plans. Interior takes account of the economic impact and other values that protection of water quality will have on the communities, the basin, the State and the Nation.

In conclusion, I would like to urge that steps be taken to eliminate from the Boston Harbor area those domestic and industrial pollutants which detract from the full public enjoyment of the aquatic resources of this area.

The Geological Survey can furnish data on total amount of water flowing into the harbor from the Charles, Mystic and Neponset Rivers. These data can be given on any kind of statistical basis required - total amount, daily amount, monthly or any particular data required.

Statements will be presented here today by representatives of two other Bureaus which have varying responsibilities in the region under consideration. These are the Bureau of Sport Fisheries and Wildlife and the statement will be made by the Regional Director Richard Griffith and by the Bureau of Commercial Fisheries and that statement will be given by the Assistant Regional Director, Don Aska. Thank you.

CHAIRMAN STEIN: Thank you, Mr. Abelson. Are there any comments or questions. All right. Mr. Klashman?

MR. KLASHMAN: Mr. Chairman, I notice that Mr. Conley is now in the room and I would like to call on him to answer Mr. Yasi's question on the Federal installations. Mr. Conley, will you identify yourself please.

EDWARD J. CONLEY, FEDERAL ACTIVITIES
COORDINATOR, NORTHEAST REGION, U. S.
DEPARTMENT OF THE INTERIOR, FEDERAL
WATER POLLUTION CONTROL ADMINISTRA-
TION, BOSTON, MASSACHUSETTS

MR. CONLEY: My name is Edward Conley, I am the Federal Activities Coordinator for the Northeast Region of the Federal Water Pollution Control Administration. Mr. Yasi, would you ask the question again, I wasn't in the room.

MR. YASI: Yes, certainly. My question was if there is a Federal implemenation plan and if there is could the State water pollution control agency have a copy of it?

MR. CONLEY: I have received this morning a copy of the implementation plan proposed by the Navy for abatement of their industrial waste being generated over at the Boston Navy facilility. This will begin this month and will be completed by the end of June or the beginning of July 1969. With respect to vessel pollution I cannot give you data on that and I don't think anyone can.

CHAIRMAN STEIN: Let's see if we can do it this way, because I think it is important, Mr. Conley. Let's take report table 2 and let's go through these one at a time.

MR. KLASHMAN: That is page 24.

CHAIRMAN STEIN: When we come to an installation that needs remedial action, I would like a recommendation from you. You may consult with Mr. Newman or anyone else as to precisely what they need and when in your opinion this should be put into effect. The Boston Army Base, that is connected to the city sewer and nothing there has to be done?

MR. CONLEY: That is right.

CHAIRMAN STEIN: For the benefit of the audience, any Federal installation or industry that is lucky enough to be connected to a municipality sewer system has absolved itself of the legal and technical responsibility for treating this. It is very well set out in the laws and there is no exception that I know of that the municipality is responsible. All right.

The next is the Family housing area in Winthrop and that is city sewer. All right. Now, let's get to the Nike Ajax Site B-36.

MR. CONLEY: This is an Army installation on Hog Island off the Hull Peninsula and has a septic tank and it chlorinates its effluent and this effluent is in turn discharged to the Hull Bay. This is not in conformance with the requirements of Executive Order 11288, which requires preferably a connection to a municipal system or if not a minimum of secondary treatment. In this case the Army will be required to meet the requirements of the Executive Order and probably go to secondary treatment.

CHAIRMAN STEIN: This is secondary treatment plus chlorination?

MR. CONLEY: Yes.

CHAIRMAN STEIN: When do they think they can do it?

MR. CONLEY: At least 18 months probably.

CHAIRMAN STEIN: How long should it take them until they make up their minds if they are going to connect to the sewer or go to---

MR. CONLEY: This would have to be studied by the engineers.

CHAIRMAN STEIN: I understand that, but how long before they can make a determination, six months?

MR. CONLEY: Yes, I would say six months.

CHAIRMAN STEIN: Let's go slowly on this because it is important. You think 18 months from now for the whole job?

MR. CONLEY: Yes.

CHAIRMAN STEIN: All right. By the way, the people who represent the Army Nike installation will have an opportunity to make statements if they wish on this.

The Windmill Point lifeboat station is connected to the Hull town sewer as is the Point Allerton station. Now, as to the Deer Island light station.

MR. CONLEY: This is a small, as you can see, installation out in the middle of the harbor (President Roads) presently has no treatment and it discharges about 240 gallons a day directly to the ocean, to the harbor. This is not in accordance with the Executive Order and we would recommend that as an interim measure - and I emphasize interim measures - that the Coast Guard consider the use of an effective macerator chlorinator until some such solution can be worked out that would be more permanent.

CHAIRMAN STEIN: When do you think this should be put into effect?

MR. CONLEY: As soon as possible.

CHAIRMAN STEIN: How about time, you have a recommendation here?

MR. CONLEY: Within 18 months.

CHAIRMAN STEIN: The point is what we would like to do here is to give the other agencies an opportunity to rebut this. How much time do you think it will take? I don't think it is a big source.

MR. CONLEY: I don't think it is a big source either.

CHAIRMAN STEIN: What would you think would be a reasonable time here?

MR. CONLEY: Let's say six months for them to get started on this thing.

CHAIRMAN STEIN: All right. Boston Station Coast Guard.

MR. KLASHMAN: That is all right.

CHAIRMAN STEIN: Yes, that is Boston City sewer. All right, Base Boston.

MR. CONLEY: This is an 18,000 gallon a day installation and it is for cooling a dynamo motor. I don't think at this point we have enough information as to whether any treatment is necessary at all. I don't think there is water discharge here other than the cooling water.

CHAIRMAN STEIN: All right. How about the sanitary facilities for Base Boston?

MR. CONLEY: It is explained in the paragraph there that the water is being generated at the Coast Guard base and that these two urinals will be taken out of commission when the tie-in is made that will handle the waste being generated by the berth of the Coast Guard vessels and that is scheduled for late 1969 or early 1970.

CHAIRMAN STEIN: All right. Again I don't think it is a real big source.

MR. CONLEY: No.

CHAIRMAN STEIN: All right. Base Boston vessels in Port - your recommendation is that we do a study on that, is that correct?

MR. CONLEY: Yes, but it should be emphasized here that the Coast Guard is installing this collection system on their pier which will handle the waste being generated by the new vessels assigned to Base Boston.

CHAIRMAN STEIN: What do you mean by early 1970, can you give me the month?

MR. CONLEY: No, I can't at this time.

CHAIRMAN STEIN: Let me press you here. Again I think Mr. Yasi is entitled to this, as well as we are, and if you are going to handle a compliance problem you are going to have to have something a little more definite than early 1970.

MR. CONLEY: All right. I will say May of 1970.

CHAIRMAN STEIN: All right. That is fine. The Naval Hospital is all right. The Naval Shipyard is Boston sewer and the Boston Navy Shipyard has cooling water there and that is a large amount. You think that is a problem?

MR. CONLEY: Not to our knowledge.

CHAIRMAN STEIN: All right. How about the wastes from the machine shop and tank-cleaning operations?

MR. CONLEY: I have here the schedules submitted this morning to me by the Navy and this, as I said, proposed to eliminate this source of pollution by the 1st of July of 1969.

CHAIRMAN STEIN: All right. South Boston Naval Annex and that is all taken care of. Let's go on to the next one, Naval Shipyard and South Boston Naval Annex, berthed ships - how do we handle that?

MR. CONLEY: We wait for the results of study now in progress.

CHAIRMAN STEIN: I am just looking for your recommendation now and all the other Federal installations are all connected to city sewers and those are the Naval Station in Boston, Squantum Gardens, the Naval Terrace, Boston Motor Pool, U. S. Appraisers Stores, G.S.A. Stores and the Food and Drug Administration, is that correct?

MR. CONLEY: Yes.

CHAIRMAN STEIN: We have identified all the problem areas. Mr. Yasi?

MR. YASI: May I simply ask the question - and I don't mean to be unfair - but is there any further detail you can give us on the proposed study like who, what, when and where?

MR. CONLEY: On the Navy berthed ships?

MR. YASI: Yes.

MR. CONLEY: Well, the Navy has installed a package-treatment device in one of its destroyers now berthed in the Navy shipyard and I haven't got the results of it. There will be some operation results that will be furnished and I will forward this information to you directly.

MR. YASI: Thank you very much.

MR. CONLEY: I would like to emphasize that these recommendations and dates are ours at this point.

CHAIRMAN STEIN: Yes, of course. I think that is perfectly clear, but I do think that the other Federal installations and other people are entitled to have your recommendations before they come up. All right. Thank you very much. Mr. Klashman?

MR. KLASHMAN: I would now like to call Mr. Frank Gregg, Chairman of the New England River Basins Commission.

FRANK GREGG, CHAIRMAN, NEW ENGLAND
RIVER BASINS COMMISSION, BOSTON
MASSACHUSETTS

Frank Gregg

MR. GREGG: I am Frank Gregg, Chairman of the New England River Basin Commission. Since this is the first official appearance by a representative of the Commission before a Federal water pollution control conference in New England, it is appropriate to explain briefly what the Commission is and what it is authorized to do.

The River Basin Commission is a joint Federal-State agency established by Executive Order of the President on September 6, 1967, under provisions of the Water Resources Planning Act of 1965, upon the request of the Governors of the six New England States and the Governor of the State of New York. The Commission is composed of a Chairman appointed by the President, a member designated by the Governor of each of the member States, a member representing each of eight Federal agencies, and a member representing each of six interstate agencies with responsibilities in water and related land resources. Commissioner Yasi is the Commissioner of Natural Resources for the State of Massachusetts and is a member of the Commission for Massachusetts, and Mark Abelson, who just testified here, is a member representing the Department of the Interior. I think the Commission has two assignments under law which relate directly to management of matters before this conference. The Act was established to provide for the Commission to serve as the principal agency for the coordination of planning for use and development of water and related land resources of the region, including Federal, State, interstate, local and nongovernmental planning and the Commission is required by law to prepare and keep up to date a comprehensive, coordinated joint plan for use and development of water and related land resources of the region, including recommended actions for Federal, State, interstate, local and nongovernmental interests.

Frank Gregg

A principal assumption underlying this Water Resources Planning Act is that the total values of water and related land resources, municipal and industrial water supply, agriculture, power, navigation, outdoor recreation, scenic and cultural values, fish and wildlife production and harvest are most likely to be realized through coordinated action based on comprehensive planning programs addressed to the full range of resource values and involving all levels of government and private interest. The purpose of this conference is to help private interest and local, metropolitan, State and Federal agencies to restore and protect the quality of the waters of Boston Harbor, and I am sure you know that clean water is the key to realizing for the people of the metropolitan region the full potential of the resources of the habor.

Without minimizing in any way the values of the harbor and its associated lands for industrial, commercial, institutional and residential uses or shellfishery, for that matter, which is the primary purpose of this conference, I want to underscore the tremendous importance of this resource complex as the critical factor in supplying outdoor recreation opportunity for people.

The Metropolitan Area Planning Commission has published an excellent report on open space and recreation on the harbor, and they note in the report that Boston Harbor is one of the most beautiful harbors and could be one of the most delightful parks in America. They say it is both the most spacious recreational area in the region and the one closest to the most densely populated areas of metropolitan Boston. Revitalization of the harbor offers a unique opportunity to meet the pressing demands for water-oriented recreation; to conserve valuable marine resources and to create a handsome waterfront setting for surrounding residential, commercial and industrial uses.

Since the New England River Basin Commission has not carried out any study in Boston Harbor, I am not in a position to comment on the specific points in issue before this conference. It may be useful to note a few points on which I am sure the conferees will agree: The harbor is a highly significant and complex natural resource, which is one of the most significant in New England,and among the major factors which limit the realization of these resource values include additional pollution, lack of access, derelict and deteriorating waterfront areas, wasteful and inappropriate uses of limited shorelines, but among these pollution is the most critical and after efforts are made to get the water clean, the water quality should be strengthened promptly, results appraised systematically, programs reordered and further strengthened as necessary.

The water quality control problems of the harbor are complex. Major waste treatment works even if operated at design capacity will deal with only part of the problem. Debris, stormwater, oil, nutrients from treatment plants, discharges from ships and boats, runoff from the urban area pose separate and difficult problems.

The financial resources available for pollution control are not unlimited. Priorities may have to be set in the harbor for the allocation of public funds for pollution abatement, both within the harbor area and between the harbor and other areas of the State. I think it is useful to note that there is a financial pinch on, particularly in Federal funding, and we will not be able to do everything at once.

A planned, continuing long-range program for water quality control in the harbor, in my opinion, is most likely to come from a comprehensive, multiple-purpose program which is directed at all the problems and all the uses and all the values of the harbor area. These include the vitality of the Port of Boston - it is a major shipping area - and in other industrial, commercial, institutional and residential uses of land, public access to shores and waters and acquisition, protection and management of land and water areas of high value for natural, scenic, scientific, cultural and recreational purposes.

The Metropolitan Area Planning Council, the Metropolitan District Commission, and a number of State and Federal agencies have worked toward such a comprehensive program. These efforts to develop coordinated action should be continued.

The New England River Basin Commission was established to help secure such coordination, the kind that I am arguing for. The Commission is not yet fully staffed and is clearly not yet in a position to lead a comprehensive study of water and related land resources of the harbor region. It may, however, provide an immediately useful mechanism through which local, metropolitan, State and Federal officials and agencies can work for a more comprehensive, long-range program for the harbor and, as its Chairman, I am glad to offer the good offices of this Commission for this purpose, repeating the reservation I made earlier about the fact that we are not a full operation. I believe it is entirely appropriate that the most pressing pollution programs be dealt with on a priority basis. There is no reason it can't, and I am certainly not trying to provide a reason for delaying the pollution programs in the interest of a broad comprehensive program, because pollution does rob the metropolitan area in many ways. The decimation of the shellfisheries is one; also the damage to fisheries of commercial and recreational value; also pollution makes boating often unpleasant and sometimes hazardous or requires the closing of beaches, depreciates property value and makes for undesirable water growth. It seems to me that - and I offer this as a part of my statement as a newcomer to this region - the pollution of the water of the harbor robs the people of Boston of a source of pride, inspiration, recreation and economic opportunity that this rich and beautiful, natural feature, under effective management, could bring to all who live near it. It ought to provide what I believe to be a significant effect on the general public morale of the Boston metropolitan area.

I note in closing that portions of the harbor lie close to Boston's ghetto areas and clean water and attractive, well-managed beach recreation areas, accessible by public transportation, can contribute much to the poor of all races. We urge these specific priorities not only for the water pollution control programs but other programs in the harbor and these have the highest possible priority in our plans to help these people. Thank you very much.

MR. YASI: Mr. Chairman?

CHAIRMAN STEIN: Yes?

MR. YASI: I would like to say immediately that we accept the kind offer of the Chairman of the New England River Basin Commission on behalf of the Commonwealth. I am sure that I speak for his Excellency. As the State's representative for the Commission, we more than welcome this. We would hope this offer will be accepted down the line. I am really very happy to hear it made publicly and I want to put on this record as accepting, even with the obvious knowledge which I already had, of course, that they are not fully staffed, and I think there is an absolute need for this type of coordination and this will be most helpful to the State and I would hope also helpful to the Federal agency. Thank you.

CHAIRMAN STEIN: Are there any other questions?

MR. KLASHMAN: Mr. Yasi, do I understand you to accept Mr. Gregg's offer to Chair a group as a substitute for the group that the Governor is picking, in addition to it?

MR. YASI: I am afraid that I don't have the authority to do that. However, as you know, I am a member - along with you - on the Commission. I would be happy to go back to his Excellency and to talk also to the interagency groups - the city and town groups. I honestly didn't know about this before today, and the Chairman will attest to this, and I am afraid that I can't answer your question now.

MR. KLASHMAN: I just wanted to make sure.

MR. GREGG: I would think, in any event, that what we are talking about here is making use of the Commission as an institution to which everybody is already represented and we ought to be quite open minded here, if this makes sense.

MR. YASI: This certainly makes sense to me and I repeat that we are more than interested.

CHAIRMAN STEIN: Thank you. We are glad to welcome back Frank Gregg. It has been a long time since we have seen Mr. Gregg and you can judge that our paths have crossed in the past and he has always been very helpful in pollution control, both in and out the Federal Government. I believe that we have two proposals though that sort of overlap and we should try our best to put these together. I think it has been indicated by all parties here that they were not very far apart. I do think, though, in looking at the specificity that we had in the Governor's proposal, this deals pretty specifically with pollution control, while Mr. Gregg's proposals deal with the general resources of the area.

Now, I also think both of these are very, very important. I hope the States and this includes the Federal Government have an opportunity to take advantage of the New England River Basin Commission proposal for coordination. I can see where it would be possible to make use of this commission to perform this coordinating function and I would hope that the conferees can put their efforts in that direction and we can all get a coordinated approach to this, whatever agency does it.

MR. GREGG: Thank you.

CHAIRMAN STEIN: Are there any other comments or questions?

MR. YASI: No, I just hope I didn't lead you astray, Mr. Chairman. What I am saying is this: I think there is more to this program than our dealing with the water pollution control aspects. Obviously, this is our primary function here today. But I think to do this and do this without the various side functions of other Federal and State agencies is not doing the job the way we should do it today. I wanted to empahsize the point that without giving up anything that the Governor has recommended that we do it by coordinating this with the River Basin Commission. I think we all agree this would be fantastic and perhaps historic.

CHAIRMAN STEIN: That is right and this is the point I want to make. I don't think this should be prejudged until we hear from the conferees, but I think the seven points that were included in the

Governor's statement are very precise and deal with water quality and pollution control. I think the Governor indicated a date that he was supposed to come up with of January 1969 and it seems to me that if we could use the seven points, together with the points that Mr. Gregg came up with, and put the resources and the good offices of that Commission in operation, we may be striking a real blow for pollution control. We tried to do this at the Great Lakes River Basin and there were some problems that developed. This is a wonderful opportunity - a real opprotunity - to really use this device. I for one will ask the conferees to seriously consider using this device if we possibly can to see if we can move this forward.

MR. YASI: Mr. Chairman, we sound like we are in complete agreement.

MR. KLASHMAN: Mr. Chairman, before we call our next witness, in connection with Mr. Conley's presentation, I would like to submit for the transcript a proposal - a plan of action to eliminate disposal of the Bureau of Naval Ships industrial waste into Boston Harbor. I would like that to go into the record.

CHAIRMAN STEIN: Without objection this will be done.

(The above-mentioned document follows.)

MR. KLASHMAN: I should now like to call upon Mr. Richard E. Griffith, Regional Director of the United States Department of Interior Bureau of Interior Bureau of Sport Fisheries and Wildlife. Mr. Griffith.

RICHARD E. GRIFFITH, DIRECTOR, NORTHEAST
REGION, U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE,
BOSTON, MASSACHUSETTS

4

PLAN OF ACTION TO ELIMINATE DISPOSAL OF BNS INDUSTRIAL WASTE INTO BOST

TYPE OF INDUSTRIAL WASTE	SOURCE	GALLONS PER YEAR	AVERAGE GALLONS PER WEEK
A. INDUSTRIAL WASTES DISPOSED OF INTO HARBOR THROUGH STORM DRAINS			
1. Spent water soluble chemical emulsion (Shamrock "G") used as a coolant in metal cutting machinery.	Shop 06, Bldg. 42	600	12
	Shop 31, Bldg. 42	20,000	385
2. Spent Acids (2% strength when disposed):			
(a) 16% Original Solution Sulphuric Acid	Shop 56, Bldg. 195	2,000	40
	Shop 17, Bldg. 103	100	2
	Shop 14, Platefield	* 2,900	58
(b) 16% Original Solution Muriatic Acid	Shop 56, Bldg. 195	5,000	100
	Shop 17, Bldg. 103	100	2
(c) Nitric Acid Solution	Shop 56, Bldg. 195	300	6
	Shop 17, Bldg. 103	100	2
3. Spent Cleaning Solvents:			
(a) Trichlorethylene Solution	Shop 56, Bldg. 195	1,000	20
	Shop 17, Bldg. 103	100	2
(b) Misc. Spent Paint, Carbon & Grease Remover Solvents	Shop 56, Bldg. 195	3,800	76
	Shop 31, Bldg. 42	100	2
(c) Bright Dip Solution	Shop 56, Bldg. 195	1,000	20
	Shop 17, Bldg. 103	100	2
4. Spent 16% Original Strength Caustic Soda Solution (2% Strength when disposed)	Shop 56, Bldg. 195	26,000	520
	Shop 17, Bldg. 103	500	10
	Shop 14, Platefield	*4,500	90

B

Prepared by Code 446
14 May 1968

INATE DISPOSAL OF BNS INDUSTRIAL WASTE INTO BOSTON HARBOR

SOURCE	GALLONS PER YEAR	AVERAGE GALLONS PER WEEK	PROPOSED CORRECTIVE ACTION
Shop 06, Bldg. 42	600	12	Dispose of into Shipyard's sanitary sewer.
Shop 31, Bldg. 42	20,000	385	
Shop 56, Bldg. 195	2,000	40	Neutralize all acids and dispose of into Shipyard's sanitary sewer. *A Wheelabrator Unit has been purchased for use in the Platefield Area which will remove rust and scale without the need of chemicals. It is expected to be in use before the end of Calendar Year 1968. This unit will obviate the need for the acid tanks in this area which will reduce the disposal of sulphuric acid by 2,900 GPY.
Shop 17, Bldg. 103	100	2	
Shop 14, Platefield	* 2,900	58	
Shop 56, Bldg. 195	5,000	100	
Shop 17, Bldg. 103	100	2	
Shop 56, Bldg. 195	300	6	
Shop 17, Bldg. 103	100	2	
Shop 56, Bldg. 195	1,000	20	Contract for disposal by commercial tank truck.
Shop 17, Bldg. 103	100	2	
Shop 56, Bldg. 195	3,800	76	
Shop 31, Bldg. 42	100	2	
Shop 56, Bldg. 195	1,000	20	
Shop 17, Bldg. 103	100	2	
Shop 56, Bldg. 195	26,000	520	Neutralize Caustic Soda Solution and dispose of into Shipyard's sanitary sewer. * Planned installation of "Wheelabrator " in Platefield Area will obviate need for Caustic Tank which will reduce the disposal of Caustic Soda by 4,500 GPY.
Shop 17, Bldg. 103	500	10	
Shop 14, Platefield	*4,500	90	

A

PLAN OF ACTION TO ELIMINATE DISPOSAL OF BNS INDUSTRIAL WASTE INTO BOST

TYPE OF INDUSTRIAL WASTE	SOURCE	GALLONS PER YEAR	AVERAGE GALLONS PER WEEK
B. INDUSTRIAL WASTE DISPOSED OF DIRECTLY INTO HARBOR			
1. Spent Acid used to clean ships' boilers consisting of the following mixed solution:	Shop 99-Pierside	134,800	2,700
38,400 Gals. of 10% Solution Hydrochloric Acid			
12,800 Lbs. Ammonium Bifluoride			
12,800 Lbs. Diethylthiouria			
130 Gals. Detergent (Igepal)			
250 Gals. Rodine #213 Inhibitor			
96,000 Gals. Fresh Water			
(Approx. 7% strength when disposed)			

B

IMINATE DISPOSAL OF BNS INDUSTRIAL WASTE INTO BOSTON HARBOR

SOURCE	GALLONS PER YEAR	AVERAGE GALLONS PER WEEK	PROPOSED CORRECTIVE ACTION
Shop 99-Pierside	134,800	2,700	The quantity noted represents last year's acid cleaning of boilers on approximately (14) to (16) ships. Currently, approximately 75% of the acid cleaning of ships' boilers is being accomplished at another activity outside of the Boston area. This reduces the disposal of waste directly into the Harbor by about 100,000 GPY. The remaining 25% (35,000 GPY), representing the work to be accomplished at Boston Naval Shipyard, can be disposed of by pumping the spent solution back into the tank trailers utilized by Shop 99 for the acid cleaning function; neutralize the acid and dispose of into the Shipyard's sanitary sewer.

Richard E. Griffith

MR. GRIFFITH: My name is Richard E. Griffith. I am the Director of the Northeast Region of the Department of the Interior Bureau of Sport Fisheries and Wildlife.

I am glad to have the opportunity to register my agency's sincere interest in improving the environment of fish and wildlife resources in Boston Harbor.

In common with other agencies of the Department of the Interior, the Bureau of Sport Fisheries and Wildlife, recognizes that the problem of pollution abatement must be attacked on a wide front, on a scale that will tax the resources of all levels of government.

Here in the Northeast, our Bureau is actively engaged in this war on pollution at several places. In cooperation with State resource agencies, we are making progress in the attempt to make our New England rivers habitable for Atlantic salmon.

Thermal pollution is being intensively studied at several spots in the northeast.

Clean waters in Boston Harbor will mean making available to urban youth vastly improved recreational opportunities, urgently needed these days. The finfish and shellfish resources of the waters near the city will prove to be valuable assets to those trying to improve the environment of disadvantaged urban citizens.

The responsibility given our Bureau of Sport Fisheries by Congress to manage migratory birds challenges our research personnel and our wildlife management biologists to find an answer to the problems posed by a unique wildlife species - the herring gull.

For both the herring and black-backed gulls there is conflict with several important human interests, including hazards to public safety in air transportation and sanitation, also property damage to airplanes, boats, dock facilities, fishery resources, agricultural crops and many other economic assets and displacement and destruction of more desirable wildlife species.

The herring gull is an interesting example of a population explosion in a wildlife species. At the turn of the century this gull did not occur in significant numbers south of the Maine coast. Today they are most abundant in the metropolitan areas between Boston and Baltimore. Contrary to the reaction of most wildlife to man's invasion of wildlife habitat, the gull thrives in close proximity to man and his garbage.

The immediate point of friction between gulls and aircraft stems from the fact that many airports are built on low lands near major cities, with food-processing plants and rubbish disposal areas usually located nearby.

The gull's propensity for alleviating unsanitary conditions, especially around fishing ports and on poorly managed municipal dumps,has established its reputation in some quarters as a useful scavenger. Sewage outfalls, piggeries and similar noisome situations created by man also attract gulls.

The gull, as a hazard to aircraft, has led to much investigation of ways and means of keeping birds and aircraft apart.

The answer to the question of what to do about the gull can be simply stated. Make metropolitan areas unattractive to gulls and they will seek their former environment along the seashore. Studies have established that whenever a dump is closed a few days, the gulls leave. The gulls desert a fish pier when no ships are being unloaded. Whenever the food customarily available or a piggery is not present no gulls are found.

Although the immediate attack on the problem can be stated simply "clean up the environment," carrying out the program is far from simple. A successful campaign will require complete cooperation among all levels of government and industry. Sterilizing one or two dumps or reducing harbor pollution or destroying the eggs on one or two breeding areas will not suffice. An all-out campaign to deny the gull its smorgasbord of garbage and sewage waste and force it to earn its living between the tides on such natural foods as mussels and starfish, plus the application of effective control methods, may lead future generations to think of the herring gull and its graceful flight as a welcome symbol of coastal scenery. Thank you.

CHAIRMAN STEIN: Thank you. Are there any comments or questions? If not, thank you very much.

MR. KLASHMAN: Thank you very much. If there are any other Federal agency representatives other than the U. S. Public Health Service who wish to make statements, I wish they would let Mr Pahren know right now. I now call on Mr. Aska of the Commercial Fisheries.

DONALD ASKA, DEPUTY REGIONAL DIRECTOR, NORTH ATLANTIC REGION, BUREAU OF COMMERCIAL FISHERIES

U. S. DEPARTMENT OF THE INTERIOR,

GLOUCESTER, MASSACHUSETTS

MR. ASKA: Mr. Chairman and conferees, my name is Donald Aska, Deputy Regional Director of the North Atlantic Region, Bureau of Commercial Fisheries, headquarters in Gloucester, Massachusetts. We are one of the two Bureaus in the United States Fish and Wildlife Service. I have a prepared statement which I shall furnish for the record.

The greatest source of water pollution in Boston Harbor is the discharge of municipal waste. We understand that about 460 million gallons a day of raw or partially treated sewage from the Boston Metropolitan area is discharged through two major sewage systems operated by the Metropolitan District Commission. Additional pollution is discharged in the harbor and its tributaries from vessels, other water pollution control plants which are providing inadequate treatment and overflows from combined sewers carrying both sewage and stormwater.

The soft clam is the only abundant commercially valuable shellfish species in Boston Harobr. Many of the intertidal flats in the city of Boston provide substantial and suitable habitat for soft clams.

Although there is no evidence that pollution has been directly responsible for soft clam mortality in recent years, it has drastically affected shellfish utilization by the closure of more than 1,000 acres of intertidal area in Boston Harbor. Soft clams filter large volumes of water through their gills during the feeding process and may become contaminated by straining out bacteria and viruses which are present in water containing raw domestic sewage. Because of the danger of transmitting these harmful organisms to humans, contaminated clams cannot be harvested and utilized for food. Boston Harbor shellfish beds were closed by the State of Massachusetts because of bacterial contamination in the harbor waters. We conclude that only an intensive pollution abatement program will enable greater utilization of this valuable shellfish resource.

The coastal streams along the North Atlantic coast, including the Charles River and Neponset River, are now being studied with the intent to reestablish runs of alewives, American shad and other anadromous fishes. These studies are being made under the provisions of the Anadromous Fish Act, Public Law 89-304, enacted by Congress and signed by President Johnson in October 1965. There is positive hope for pollution abatement in the Neponset and Charles Rivers which will facilitate the restoration of anadromous fish. This restoration program could be blocked by gross pollution in Boston Harbor because of unsuitable water quality for these migratory fish.

It is the position of this Bureau that the ultimate goal of the Clean Water program of this Nation should be to maintain or achieve such water quality in every stream, lake,estuary, bay or other waters and the full potential of that water for production of aquatic life and water-dependent commercial fishery resources can be realized. Thank you.

CHAIRMAN STEIN: Thank you, Mr. Aska. Are there any comments or questions. All right. Thank you, sir. Mr. Klashman.

MR. KLASHMAN: I would like to now call on Mr. Charles Larson, Regional Shellfish Consultant, United States Public Health Service. Mr. Larson, we would like to take this opportunity to congratulate you on your recent announcement of your engagement.

CHARLES LARSON, REGIONAL SHELLFISH CONSULTANT,
U. S. DEPARTMENT OF HEALTH, EDUCATION,AND
WELFARE, PUBLIC HEALTH SERVICE, BOSTON, MASSACHUSETTS

MR. LARSON: Thank you.

Mr. Chairman, Mr. Klashman ladies and gentlemen, my name is

Charles Larson

Charles Larson and I am Regional Shellfish Consultant of the United States Public Health Service.

The Department of Health, Education, and Welfare, through its Public Health Service Water Supply and Sea Resources Program, welcomes this opportunity to sepak in favor of the continuing efforts to abate water pollution in Boston Harbor. It welcomes the opportunity especially because this hearing is a major occurrence where a Federal Water Pollution Control Administration abatement action is based primarily upon health considerations.

Boston Harbor has international significance. Not only is it a major seaport in the United States but immediately adjacent to its waters is Logan International Airport at which visitors from this country and abroad constantly come and go. Boston Harbor is, therefore, a focal point of attention, and improvement of its quality will be beneficial from many viewpoints, among which are recreation, solid-waste disposal and shellfish harvesting.

The Public Health Service has been active in the field of shellfish sanitation since 1925, the year of a typhoid fever outbreak, attributed to the consumption of oysters taken from polluted waters.

Shellfish (oysters, clams and mussels) have an unusual potential for the transmission of viral or bacterial disease to man. This unusual potential can be attributed to three factors:

1. The environmental growth tolerances are such that they ordinarily grow only in estuaries in which there is a mixture of fresh and salt water. These are also areas most subject to pollution by both industrial and municipal wastes.

2. Shellfish are filter feeders. In the process of feeding

they pump large quantities of water across their gill systems. Particulate material and dissolved substances are removed and concentrated to levels above that of the overlying water. For example, the softshell clam (Mya arenaria) during a period of active feeding concentrates bacteria by a factor of fifteen. They also can concentrate metals, pesticides, and radionuclides.

3. Shellfish are frequently consumed raw or with little cooking and the entire animal except the shell is eaten.

Following the typhoid fever outbreaks, the State shellfish control agencies and the shellfish industry requested the Public Health Service to aid them in developing a program of shellfish sanitation which would reestablish consumer confidence in this important food item. Minimum standards were developed for adoption by all shellfish-producing States and, since that date, the standards have been revised and updated several times, the current edition being the 1965 National Shellfish Sanitation Program Manual of Operations. Part I of the Manual prescribes criteria for surveying and classifying shellfish growing waters. All of the shellfish waters in the Commonwealth of Massachusetts have been surveyed or are being resurveyed by the Massachusetts Department of Public Health in a cooperative program with the United States Public Health Service. They have been classified as follows:

A. Approved: Shellfish may be taken from these areas for direct marketing. Mean coliform content of the overlying water shall not exceed 70 MPN.

B. Restricted or Moderately Polluted: These are areas where shellfish may be taken under close supervision for depuration (purification) in a properly designed and operated plant. Mean coliform content shall--

Charles Larson

of the overlying water shall not exceed 700 MPN.

C. Closed or Prohibited: This classification covers grossly polluted areas where shellfish cannot be taken for any purpose other than relaying under special written permits and supervision of the Department of Natural Resources.

A fourth classification used by the National Shellfish Sanitation Program is "Conditionally approved" which states, "The suitability of some areas for harvesting shellfish for direct marketing is dependent upon the attainment of an established performance standard by sewage treatment works discharging effluent directly or indirectly to the area. The sanitary quality of an area also may be affected by seasonal population or sporadic use of a dock or harbor facility."

On the basis of 43 years experience, it is known that the classification criteria for approved areas afford a reasonable safety margin and that shellfish harvested from areas meeting these criteria will not be involved in the transmission of bacterial or viral disease. It is also known that sewage treatment processes reduce the number of virus particles, although it is indicated that virus inactivation by chlorine is hindered by the presence of organic matter.

Water Quality improvement programs whose purpose is to provide additional approved or conditionally approved areas for the direct market harvesting of shellfish must take into consideration the National Shellfish Sanitation Program requirements. In other words, when the water quality of a potential shellfish harvest area is to depend upon the design, construction and operation of a sewage treatment facility, the pollution abatement program should be guided at all stages of planning by National Shellfish Sanitation Program recommendations. It is evident from a review of the Federal Water Pollution Control Administration report that this has been done.

These facts are cited also so that they will be given adequate consideration in future water quality improvement programs aimed at the eventual use of Boston Harbor as a shellfish harvest area for direct marketing or for marketing following purification. Not only is the building and placement of the sewage treatment facility involved, but of equal improtance so is the design and construction of associated sewage collection systems. The abatement program should demonstrate that it can provide continuously an approved degree of treatment at all times during which the related area is to be used for shellfish harvesting. The possibility that the treatment facility may provide better than the designed degree of treatment most of the time is all to the good, but for a raw food resource the assured level of treatment which will be constantly met is the critical consideration. This will determine the location and the area of any additional shellfish harvest that might be made available in accordance with the National Shellfish Sanitation program. It must also be realized that reclassification of Boston Harbor "Closed" areas will depend upon determination by the Massachusetts Department of Public Health, that the water quality has been restored to acceptable levels and that this restoration is permanent.

The Department of Health, Education,and Welfare, has long viewed Boston Harbor as a potential health resource which presently cannot be used fully. It is a potential resource from the viewpoint of recreation, as along its shores there are beaches closed to bathing. Boston Harbor is a potential resource because of the clams that gorw in its estuarine waters. At the present time, as should be noted,the entire Harbor area with some rather minor exceptions is closed to the taking of

Shellfish.

The Public Health Service is vitally interested for the reasons stated above in seeing that more waters meet the criteria for growing and harvesting shellfish for human consumption. In this connection, we are glad to continue to support and advocate any and all actions that will upgrade the water quality of Boston Harbor and especially those actions which will result in reclamation of closed shellfish harvest areas.

The Federal Water Pollution Control Administration, during the summer of 1967, did extensive work to determine the quality of Boston Harbor water. The Public Health Service has calculated from this data that the average total coliform for all sampling stations was 20,647 MPN. Maximum coliform were noted up to the concentration of 2,400,000 MPN. Furthermore, a review of all of the bacterial data presented in the report shows that at no time were the values anywhere near the standards (70 MPN) prescribed by the Public Health Service for approved shellfish growing areas and at only two stations, H-8 and H-9, did the numbers come within the allowable limit (700 MPN) for restricted shellfish growing areas.

The primary interest of this Department relates to the protection of the public health. It is evident from the above discussion why there has been closure of Boston Harbor to the taking of shellfish, a healthful food. With the abatement of pollution to levels which will provide growing area water meeting Public Health Service standards, a large resource of food from the sea would become available.

A second goal of the shellfish sanitation program is to preserve all possible coastal areas for shellfish harvesting. It was "the conviction of the 1964 National Shellfish Sanitation Workshop that survival of the shellfish industry is in the best public interest; that by application of the above principals on a State-by-State basis shellfish can continue to be used safely as food and to make a valuable contribution to the economic structure of the Nation both in the immediate, present and the foreseeable future." It is estimated that opening the closed areas of Boston Harbor would permit harvesting of shellfish to a total market value of about $1,000,000 per year.

Returning briefly to the subject of recreation, particularly water-based recreation, we regard such recreation as a positive method for improving the health of our people. Few would debate the mental health benefits people experience from vacations or outings spent along the shore. Boston is a city selected by the Federal Government as a Model City under the Public Law 89-754, the Demonstration Cities & Metropolitan Development Act. This means that it has significant segments of its population for whom all possible outdoor recreation areas should be made available at reasonable distances. By improving the quality of the waters of Boston Harbor through the abatement of pollution, there should come a day when bathing will be possible in all areas presently unfit for that purpose.

Another area of health concern is solid waste disposal. The burning of the demolition debris and other rubbish on barges near Lovells and Green Islands has resulted in numerous complaints from residents in Hull and Winthrop. The burning of this debris attempts to solve one problem, that of solid waste disposal, but creates an air pollution problem. A number of these barges have broken loose and have either run aground or sunk. Debris from these barges has at times spilled over into the harbor waters causing a serious hazard to small boat operators.

The Public Health Service is interested in eliminating all of the problems and hazards associated with this practice.

In summary, this Department views as of great importance the efforts to abate pollution in Boston Harbor because of the large resources which could be made available to the people of Boston and Massachusetts through an increased supply of shellfish and the opening of recreation areas. We are, therefore, supporting the recommendations of the Federal Water Pollution Control Administration that will upgrade the water quality of Boston Harbor. Thank you.

CHAIRMAN STEIN: Thank you, Mr. Larson. Are there any comments or questions. Thank you very much. Mr. Klashman?

MR. KLASHMAN: Let me first ask if there are any other Federal agencies that wish to appear? All right, that concludes our presentation, Mr. Chairman.

CHAIRMAN STEIN: All right We will call on the Commonwealth of Massachusetts at this time.

MR. McMAHON: Mr. Chairman, our first speaker this afternoon is Mr. George Spraig from the Attorney General's office.

HONORABLE ELLIOT L. RICHARDSON, ATTORNEY GENERAL, COMMONWEALTH OF MASSACHUSETTS,

BOSTON, MASSACHUSETTS

(represented by George Spraig from the Attorney General's office)

MR. SPRAIG: Mr. Chairman, I am here representing the Assistant Attorney General, Mr. Harold Putnam, who has been detained in court. This is a statement of Attorney General Elliot Richardson to the

Honorable Elliot L. Richardson

Federal and State conferees on pollution of Boston Harbor.

Gentlemen: I appreciate this opprotunity to appear before you and to testify to the concern of the citizens of this Commonwealth and of me, personally, with the persistent pollution of Boston Harbor.

I understand that Governor John A. Volpe will submit a statement to this hearing, setting forth the interest of his administration in this matter, but I thought it might be helpful if I added to that my own statement as to the effectiveness or ineffectiveness of our existing laws, and a brief description of the activities of my Department to assist you in ending this menace to the health and well-being of the people of Boston and Massachusetts.

Large quantities of debris, mostly from city demolition operations, have been burned aboard barges in outer Boston Harbor in recent years, to the anguish of residents of Hull and Winthrop who have been shrouded with smoke frequently from the smouldering fires. Our investigation revealed that our statutes never contemplated fires on barges at sea, and raised doubts as to the powers of the State Department of Public Works to supervise and control this operation.

We filed Bill H. 1534 this year to remove any such doubts, and I am pleased to report that the measure has passed the House and is now in the Senate Committee on Ways and Means. We invite full support for this bill so that it may become law in the very near future.

We have been deeply concerned about the oil spill problem, which is most serious in Boston Harbor, and which threatens other sections of our coastline from time to time. I filed S. 1003, which is now S. 1079, to bring this matter under reasonable public control. The bill authorizes our Division of Water Pollution Control to supervise pickup operations and to assess the costs upon the parties responsible.

It provides for the licensing of oil terminals and the issuance of reasonable rules and regulations.

It did require that booms be placed around every discharging tanker, but we have yielded to an industry request that that requirement be relaxed in favor of stringent measures which the industry is adopting voluntarily, and we have agreed to a one-year trial period.

It tackles the very serious waste oil problem. Our investigation convinced us that about 5,000,000 gallons of waste oil, mostly crank-case oil, is being disposed of surreptitiously in streams, harbors and dumps of Greater Boston. This is a matter which deserves the highest priority, not only in Boston but in Washington and throughout the Nation, because our study shows that neither the Federal Government nor the National Petroleum Institute has an answer to the problem at this time and the problem is growing.

I recommended drastic State action in Section 53 of S. 1003, but the Committee on Natural Resources of our State legislature and our Department of Natural Resources have favored a study by a competent engineering firm before firm State action is taken. In my opinion, no single action can do more to reduce oil pollution of our waters than solution of this problem, and I urge that no time be lost in coming up with a practical answer.

I am pleased to report that S. 1003 has just been reported favorably in the State legislature and I am confident that early passage can be expected if everyone concerned with clean water will keep their wishes before their State legislators.

Much of the pollution to be found in Boston Harbor is coming down the Charles River, where it is also a source of annoyance to the towns and cities along that historic and vital watercourse.

The importance of the Charles River for park and recreational purposes must be restored as soon as possible, and other rivers of our Commonwealth must benefit also from intelligent water management. Along with the conservation experts, I have reached the conclusion that flood control, recreational boating, swimming, water supply, river-bank improvement, sewage treatment - all these water uses can be managed test by river basin commissions having some substantial authority over all the possible uses in all the communities within the watershed. Water respects no city and town lines and neither does pollution.

I have attempted to resolve this legal tangle by filing S. 442 in cooperation with the Honorable Robert Yasi, our Commissioner of Natural Resources, and I am pleased to report that this measure also has just been reported favorably to our State Senate.

In addition to these legislative reforms, the Department of the Attorney General is working in close cooperation with the Boston Harbor Pollution Committee, which meets under the able auspices of the Massachusetts Port Authority. Several of our legislative ideas have resulted from the expert testimony available within this dedicated group of city, State and Federal officials and of private citizens.

To provide for effective intergovernmental cooperation, we in the Attorney General's office are meeting regularly with attorneys representing the Corps of Engineers and the city of Boston, and when necessary, attorneys for various State Departments and in the Massachusetts Port Authority. Our first target is the derelict piers which add to the hazards, the pollution and the unsightliness of our harbor.

If any derelict piers are unsafe, hazardous or unlicensed, we are ready to prosecute as soon as the evidence is presented to us.

We share the belief of the Federal Government that pollution of Boston Harbor must come to an end. The beauty of the landscape, the cleanliness of its waters and the abundance of its seafood attracted our ancestors to this historic port generations ago; it is in our best interests today to cherish this heritage and to restore these qualities.

I want the Department of the Interior to know that in pursuing these goals it has my full cooperation. It also has the support of the concerned people of Massachusetts, whom it is my privilege to serve.

CHAIRMAN STEIN: Thank you. I would like you to convey my thanks to Attorney General Elliot Richardson. We have worked very closely with him on several programs on developing Federal legislation. One point I guess I could make is when the Federal Act came out of Conference on oil pollution, in the last amendment they described the discharge as something which was "willful or grossly negligent." I am sure you now realize that we have the amendment up to change this, but it hasn't been changed yet.

MR. SPRAIG: The Attorney General had a conference on oil spills back in March, I think it was, and this problem with the law was one of the things that was discussed. The Attorney General did write a letter to the Chairman of the Committee on Public Works and now hopes that it will be passed, but it is very hard to show gross negligence.

MR. McMAHON: Thank you. I will now call on the Commissioner of Public Health, Dr. Alfred Frechette, who has sent in reality John C. Collins, Director of Sanitary Engineering.

ALFRED A. FRECHETTE, M. D.
(represented by John C. Collins)
COMMISSIONER OF PUBLIC HEALTH,
COMMONWEALTH OF MASSACHUSETTS,
BOSTON, MASSACHUSETTS

MR. COLLINS: Mr. Chairman, conferees, Commissioner Frechette regrets that he cannot be present today, and he has asked me to make this statement for the Department.

The Department of Public Health is pleased to take this opportunity to speak at this conference relative to the continuing efforts and progress in the abatement of water pollution in Boston Harbor.

The Department is vitally interested in and supports all programs designed to provide adequate public health protection for the consumers of shellfish, bathers and for those using our waters for other recreational pursuits. The Department is acutely aware of the many problems facing State and related Federal agencies in the protection of the public health, and the preservation and utilization of our natural resources and the general economic advantage of pollution control to the fisheries industry.

I would remind you that over this past year the Department has worked very closely with the Department of Public Works in the elimination of burning of refuse within the harbor area and in the promulgation of criteria aimed towards the elimination of prior unsatisfactory practices. The Department, also through its efforts, has prevented the use of certain islands in Boston Harbor for the disposal of solid wastes. These efforts alone will hopefully assure the development and/or the preservation of such islands for recreational use and their historical value. Also, the

Department has continually upgraded the quality of air in Boston Harbor through enforcement of its air pollution regulations.

One of the major responsibilities of the Department of Public Health lies in the classification of shellfish growing areas in accordance with the recommendations of the Cooperative National Shellfish Sanitation program originally established by the United States Public Health Service in 1925. Shellfish areas are classified into three major categories, (1) Open, (2) Restricted and (3) Closed as discussed in the testimony of the United States Public Health Service. Under the Cooperative Shellfish Program the Department has adopted laws and regulations for the sanitary control of the shellfish industry, conducts continuous sanitary and bacteriological surveys of the growing areas, inspects shellfish plants and conducts such additional inspections, laboratory investigations, and control measures as may be necessary to insure that the shellfish reaching the consumer have been grown, harvested and processed in a sanitary manner.

The sanitary survey is the evaluation of all factors having a bearing on the sanitary quality of a shellfish growing area including sources of pollution, the effects of wind, tides and currents in the distribution and dilution of the polluting materials, and the bacteriological quality of the water.

Under these guidelines, and because of the threatened withdrawal of the Massachusetts shellfish program from certification by the United States Department of Public Health, which would prohibit the interstate traffic of all shellfish harvested in Massachusetts, the Department has had to concentrate a major portion of its effort and shellfish sanitation staff in conducting complete sanitary surveys of Boston Harbor alone. These surveys because of the extensive involvements are still continuing. However, certain shellfish areas in Boston Harbor have been reclassified and closed to the taking of shellfish for food purposes. Generally, these areas were formerly classified as Restricted and so-called Master Diggers were allowed to take shellfish for depuration (cleansing) only. All shellfish taken by Master Diggers must be submitted to a depuration plant approved by the Department of Public Health before going into the market. The reclassification of these areas has substantially reduced the harvesting of shellfish from Boston Harbor waters, but has allowed for improved operation of the Newburyport Shellfish Treatment Plant by virtue of the fact that shellfish of lower initial bacterial density are now being submitted for depuration.

I wish to point out that these shellfish areas are subject to pollution not only from the major sewer outfalls in Boston Harbor but also from the numerous direct or exterior shoreside combined sewer overflows, which number approximately 90 and are described and located in a report by Camp, Dresser & McKee, prepared for the city of Boston. In view of this, the Department feels that any study to assess pollution in Boston Harbor, such as is recommended by the Federal Water Pollution Control agency in the "Report on Pollution of the Navigable Waters of Boston Harbor," must be made broad enough in scope to include the effect of these shoreside overflows on the bacterial quality of Boston Harbor waters. Because of the proximity of these overflows to shellfish and bathing areas, these sources of direct pollution are considered to be more dangerous to the public health than the voluminous discharge of treated, chlorinated sewage into the deep waters surrounding the major sewer outfalls of Boston Harbor. The Department urges therefore that immediate consideration be given to the control or elimination of these sources of pollution.

The productive shellfish areas in Boston Harbor immediately affected by the discharge of sewage from Deer Island are located around the Logan International Airport and comprise approximately 450 acres. These areas, known as BH-A and BH-B, were closed to the taking of shellfish during August 1967. Additional areas in Boston Harbor were closed because of shoreside discharges of sewage from combined sewer overflows during June 1967 and January 1968. These shellfish areas known as BH-4, BH-5 and BH-C located in South Boston (Old Harbor) Quincy, (Squantum) and East Boston (Winthrop Harbor), respectively, comprise approximately 340 acres. Now that the Deer Island sewage treatment plant is in full operation, and once the effluent is properly chlorinated to assure adequate bacterial reduction, the Department will resurvey those shellfish areas in Boston Harbor known to be affected by this discharge with a view towards upgrading of classification to allow for the taking of shellfish for depuration. The remaining shellfish areas of Boston Harbor determined to be affected by pollution from shoreside discharges will remain closed until such time as corrective measures to control or eliminate these sources of pollution are completed.

The Department is cooperating closely with the Metropolitan District Commission in studies, research and bacteria samplings relative to discharges from both the Deer Island and the Nut Island sewage treatment plants. This work is being undertaken to determine the required chlorine dosage for bacterial control by these plants.

The Department feels that great strides in abatement of pollution have been made recently and are continuing to be made day by day. Certainly a great deal of work still remains to be done, and in particular a great deal of money must be expended in reference to the correction of stormwater overflow, without which many of the water uses, including bathing and shellfish harvesting cannot be fully realized. Again I repeat irrespective of the Deer Island and Nut Island sewage treatment plants. It therefore remains to find sources of funds to carry out these extensive corrective works.

The Department recognizes that, while a great deal of work remains, there already has been an expenditure of about $160 million to date which has resulted in a marked improvement of the Harbor waters. Of this amount the Federal contribution has been 1.2 percent. Such efforts must be continued and expanded where necessary to assure that the waters of Boston Harbor will be improved to the maximum achievable in the light of the present scientific knowledge.

In conclusion, the Department will continue its surveys and very close cooperative work with the Public Health Service, the Metropolitan District Commission, the Division of Water Pollution Control and other State, Federal and local agencies and hopefully in the not too distant future the full intended use of Boston Harbor may be realized, and adequate public health protection will be provided to the citizens of the Commonwealth. Thank you.

CHAIRMAN STEIN: Thank you. Are there any comments or questions?

MR. KLASHMAN: Mr. Collins, the $160 million expended, was that for waste treatment work?

MR. COLLINS: This was for sewer work including waste treatment work.

MR. KLASHMAN: But does it include additional things besides waste treatment?

MR. COLLINS: Part of your interceptor system and other stations in addition to this total system.

MR. KLASHMAN: Actually then the $160 million includes cost for bringing waste from outlying areas to the Boston Harbor area for discharge?

MR. COLLINS: Right.

MR. KLASHMAN: It is adding to the problem rather than solving it?

MR. COLLINS: The cost is adding?

MR. KLASHMAN: In other words, the cost--in other words, when the decision was made to bring the waste and I am not saying this is wrong, but when the decision was made to bring the waste to Boston Harbor to intercept them and to bring them in, there were other alternatives, some of them could have been to discharge them elsewhere, isn't that right?

MR. COLLINS: Oh, no doubt, there could be alternatives to the system.

MR. KLASHMAN: What I mean to point out is that $160 million is not for treatment alone but is for both treatment and interceptors?

MR. COLLINS: The major portion is for treatment.

MR. KLASHMAN: The major part is actually for treatment?

MR. COLLINS: Right.

MR. KLASHMAN: The second area I want to explore with you is when do you plan to start making studies in the harbor area relative to whether the Deer Island treatment plant went into operation?

MR. COLLINS: We are already---

MR. KLASHMAN: When do you feel that you will have information available to make a judgement?

MR. COLLINS: I would certainly say by mid-summer.

MR. KLASHMAN: Thank you very much.

CHAIRMAN STEIN: Mr. Yasi?

MR. YASI: Some days ago, the next speaker called us specifically and I did commit, with your approval, the time of approximately

2:30. So may I introduce Mr. Jack Roberts and he represents a number of yacht clubs in Boston Harbor.

JACK ROBERTS, LEWIS YACHT CLUB

BOSTON, MASSACHUSETTS

MR. ROBERTS: Mr. Chairman, I am Jack Roberts and I reside at 63 Atlantic Avenue and I am speaking for the Lewis Club, which is a harbor-side yacht club composed mostly of members who reside in the harbor, and because of their interest they have been on a 12-month observation of harbor conditions. The sewage bothers us but seems to be adequately handled. It is the oil pollution that most affects the recreational boating in the harbor and affects the development of harbor-side residential apartments. It is not comprehensible to us that an industry that spends better than one-half-billion dollars on research and development is allowed not to solve this problem. There must be some control and some control quickly of this oil spillage that is caused by the tanker fleet within the harbor, because the amount of oil that is going to be required is increasing and the problem certainly isn't going to go away. There is probably a parallel between the manner in which explosives are handled in the harbor. Because they are a menace to the health and welfare of the people, they are banned from the Inner Harbor and are handled under strict limitations and the same thing should be true of oil.

The oil tanker fleet, as I heard from the Office of the Attorney General, are surreptitiously dumping a number of gallons in the water and it is just unbelievable. I think it is the Shell Oil Company that has developed the process of separation of oil and bilge water and they can now, as I understand it, pay the entire cost of separating the oil from the bilge water by the value of the oil reclaimed. There is no economic reason why this should continue. I would say, in the long-term view, there should be every reason to consider on a regional basis the establishment of a deep-water loading port or off-shore facility which would remove the necessity of the tanker fleets coming into Boston Harbor. With the 100,000 ton vessels that are under construction now and the 200,000, 300,000 and 400,000 ton vessels that are on the drawing boards, it is the most economical way to transport large quantities of oil in vessels that have an 80-foot and upward draft, and no vessel that size can approach never-mind enter the Boston Harbor. We think that for the long-term solution, consideration should be given to banning the tanker fleet, and to some cooperative venture on the part of the States to establish a loading port and then pipeline it to the various oil facilities that store it. So, for the immediate future, we would like to see the creation of an adequate amount of equipment to scavenge the oil that is being spilled now. In the case of a major catastrophe, this equipment should be air-liftable so that the various ports around can pool the equipment, just as the fire departments pool their equipment on a regional basis. As far as inspection goes, the helicopter provides an excellent platform from which observation can be made. With air pollution being such a problem, perhaps, such a venture as the helicopter could be done. These sound like strong measures, but the major domestic problem of this country is the problem of cities; and I know of no way you can encourage residential development of the harbor and downtown area and provide the vast amount of revenues that part of the development would bring for such a small investment than in controlling both the water and the air pollution of the harbor. Thank you.

MR. YASI: Mr. Chairman, I knew he would be a good witness. One, I can't help using this forum to say that we have been begging, and I hope successfully, for a helicopter patrol and I am sure I am speaking out of school when I say I think we will have this before the beginning of the summer.

Secondly, with reference to the Attorney General and the surreptitious handling of some oils that did not relate to bilge - and I don't think you were in here when he hit on that point - this has to do with the collecting of oil. I think your point was well taken - that the only economic situation that we have run into was the separation and reuse of reclaimed oil, which has been a recent change in a little more than a year of making it or putting it in the category where it is taxed as if it were new oil. This has made it in the New England area, with the exception of perhaps East Maine, and it is uneconomical and unfortunate doubly-so for Massachusetts. Nevertheless, the Attorney General's assistant reported that there is a bill pending, as far as this State is concerned, to handle that situation. At least in the interim, there are also moves being made to take up this tax question with the Congress in the next Session. Your last point I can't answer right now but it seems well worth looking into.

CHAIRMAN STEIN: Now, you have obviously given much thought to this. You had a lot of specific comments about what to do or what should be done about oil pollution, and I think this is a question that the Federal and State authorities are taking up. I would suggest that possibly you might want to get in touch with Mr. Yasi and Mr. Klashman and see what our people are doing who are considering this nationally. Some of your ideas have been considered, and I don't have any brief on these one way or the other, but let me just indicate what some of the problems are. You say it is not economical to dump this oil, but if it weren't I am not sure that it would be done. In other words, some of us think that this is the easiest way to get rid of that stuff. Otherwise, they wouldn't let it go. The second point is: If they are really going to control oil pollution and possibly control these big vessels, you may have to think in terms of Federal control. The notion you had of going outside the port of Boston to unload may handle the harbor situation, but we have these problems like the Bureau of Commercial Fisheries that say the oil is a headache to us wherever it appears, and we have to protect every harbor and every dock which might not have the extensive facilities of Boston. We have to consider that. The other question that you might want to consider is some of these so-called accidental or surreptitious spills, and I can't help recall one situation or problem that we had. We began calling each of these as we saw them and suddenly the surreptitious spills and break in the dike stopped all at once.

Now, the advantage, of course, of uranium milling rights is that it is of advantage to the people, but for the regulatory agencies it is radioactive material and you can trace it like you trace a fingerprint. What I am saying is that even with the helicopter because you have them in the area of the oil spills, it is not very easy to try to find out where it came from and this isn't the easiest thing to do. I suggest that sometime you check with our people on one of their more intriguing ideas of putting an isotope so that each oil will be fairly well identified and the likelihood of two sources having the same batch, particularly from the shipping source, will be remote. What I am trying to say, since you have given so much thought to that, please try to see if we can come up with an integrated national policy on this. Unless we do, we are not going to move the problem of oil pollution forward. I ask all your aid on this because this is, as I said earlier, not a simple problem and the solutions that have been presented here are not without pitfalls. Thank you. Now, I understand that we have about seven more speakers and having consulted with Mr. Yasi, I think we might take a 10-minute recess at this point and we will reconvene at 3:00 o'clock.

(Whereupon a recess was taken.)

CHAIRMAN STEIN: All right. Let's reconvene. Mr. McMahon?

MR. McMAHON: I would appreciate it if, when you speak, you have a copy of your statement to please leave it with us at the end of your presentation. Our next speaker is Mr. Thomas Callaghan, Assistant to the Director of the Massachusetts Port Authority and also Chairman of the Boston Harbor Pollution Committee.

THOMAS CALLAGHAN

ASSISTANT TO THE DIRECTOR, MASSACHUSETTS PORT AUTHORITY

CHAIRMAN, BOSTON HARBOR POLLUTION COMMITTEE

BOSTON, MASSACHUSETTS

MR. CALLAGHAN: Mr. Chairman and conferees, about three years ago, the Massachusetts Port Authority, which has little statutory responsibility for pollution in the harbor, decided because of its great interest in the harbor and its improvement that there should be a coordination of the Federal, State and local efforts to abate pollution. Prior to that time, there had been a meeting of the Corps of Engineers and the general problem outlined. The Massachusetts Port Authority decided that there was a need for the encouragement of each governmental organization to take as much responsibility as it possibly could, within the scope of its own authority, and also there was another need for coordination of the activities and a further need for an understanding of the problem in Boston Harbor. The Harbor Pollution Committee had been attended by almost its full membership of approximately 30 representatives of Federal, State and local organizations including the major port, community and private interests over the course of the past three years. We met once a month and we discussed certain complaints and we determined what each individual organization which has a current problem is doing on that particular problem, and we would like to congratulate the local representatives of the Federal Water Pollution Control Administration for this most intensive report. The several members of the Federal Water Pollution Control Administration on the regional level have attended practically all our meetings, and I would just like to cite one particular instance in which there has been a great deal of coordination by the Federal people in that agency. In regard to the oil spills, for example, the Attorney General should receive a good deal of credit in initiating the legislation and encouraging everyone to join in the program. This program was outlined within the Harbor Pollution Committee, and Mr. Samuel Gozzo of the Regional Office of the Federal Water Pollution Control Administration has done a great deal of work. He has organized and explained the total program which he has worked out, and this program has been introduced into the Boston Harbor Emergency Planning Committee, and it is going to take part in the massive spill task force operation.

I would just like to conclude and say that every group within this Harbor Pollution Committee has done its utmost to correct the situations that have been brought to their attention. The State Department of Public Works took upon itself, perhaps through discussions within the committee and elsewhere, to determine what could be done in respect to the alleviation of air pollution and water pollution, and of the barges and rubbish in the Outer Harbor and the very difficult responsibility of trying to control that particular situation day and night. In respect to the oil spill situation the State Division of Water Pollution Control after initial discussions within the Committee has worked out with the Attorney General a program in which it will be authorized to spend $100,000 a year.

The City Building Department has made several surveys, and I trust that they will give you the benefit of their information and advice here today. I can cite any number of other instances of cooperation, including that of Senator Kennedy, who obtained, after we had brought it to his attention, without excluding the idea that other people have brought the same matter to his attention, the problem of hazardous drift in the harbor. The representatives have worked with Senator Kennedy and the Corps of Engineers is now doing a magnificent job in determining the sources of the hazardous drift in the harbor. I would merely like to finish by saying that the Harbor Pollution Committee is a volunteer group who spend their time, either taking it away from their daily work, and I am sure they have to add to their daily work to keep pace with the problem, or they are taking of their own time, as are representatives of the Massachusetts Bay Yacht Club Association and the Maritime Association and people of that nature. I congratulate again the State and Federal Water Pollution Control people who are responsible for this report. And I think that the centuries of neglect in Boston Harbor will soon be dissipated through the outline that is apparent in this report and the information which has been obtained through the monthly meetings of the Harbor Pollution Control and other organizations. Thank you.

CHAIRMAN STEIN: Thank you, sir. Are there any comments or questions?

MR. YASI: Mr. Chairman, I would like to take one brief moment. I don't want this to sound like a happy exchange, but few enough people know what the gentleman speaking has done. He has congratulated everyone but himself, which is quite normal for him, and I think it would be unfair not to recognize him as a real prime mover in the Harbor Coordinating

Committee, and I would simply like to make that part of the record.

MR. KLASHMAN: Mr. Callaghan, before you leave, I just want to say something for the record. We thank you for your kind words about Mr. Gozzo's work on the contingency plan. You might be interested to know that the Office of the Secretary of the Interior and our own Commission and the Federal Water Pollution Control Administration are very much concerned about this problem nationally. This plan developed by Mr. Gozzo is still in draft form, of course, and it is one of a number that are being developed all across the country, I am very gratified to learn that the Washington office considers it one of the better ones.

CHAIRMAN STEIN: Thank you very much, Mr. Callaghan. Mr. McMahon.

MR. McMAHON: Yes, I would like to call on Commissioner John Flagherty, Commissioner of the Department of Public Works from the city of Boston.

JOHN F. FLAGHERTY
COMMISSIONER OF PUBLIC WORKS
CITY OF BOSTON
BOSTON, MASSACHUSETTS

MR. FLAGHERTY: Mr. Chairman and conferees, my name is John F. Flagherty, Commissioner of Public Works, city of Boston, and I am representing Mayor Kevin H. White, and this administration is concerned with the pollution of the Boston Harbor and is interested in cooperating fully in any program that may be developed to reduce or eliminate such pollution. In February 1966, the city of Boston hired the firm of Camp, Dresser and McKee to make an engineering study or investigation of our sewerage system and submit a report on it. This report submits a plan that would eliminate entirely the pollution of harbor waters from overflows in the combined sewerage system. I have here Mr. Charles A. Parthum and Mr. David R. Horsefield from Camp, Dresser and McKee who will present to you on behalf of this Department the tunnel plan and what can be accomplished and what it will cost to implement this plan, which will require considerable financial assistance from both the Federal and State agencies.

CHAIRMAN STEIN: Thank you. Are there any comments or questions?

MR. McMAHON: I call on Mr. Charles A. Parthum of Camp, Dresser and McKee.

CHARLES A. PARTHUM

PARTNER AND CONSULTING ENGINEER

CAMP, DRESSER & McKEE

BOSTON, MASSACHUSETTS

MR. PARTHUM: My name is Charles A. Parthum and I am a partner and consulting engineer in the firm of Camp, Dresser and McKee and I have with me Mr. David R. Horsefield who is a project engineer. Both David and I have been involved in the Boston sewage problems for the last two years. I have just delivered to Mr. Murray Stein on behalf of the city of Boston a copy of our report which is in two volumes entitled, "Report on Improvement to the Boston Main Drainage System."

CHAIRMAN STEIN: I think if you would wish we could number this as an exhibit and keep this on file at our Regional Office. Would that be agreeable to you?

MR. PARTHUM: I would like to submit it as an exhibit.

CHAIRMAN STEIN: This will not appear in the actual transcript, but it will be noted as an exhibit and will be available for inspection during the normal business hours.

(the above-mentioned Exhibit #5 is on file at FWPCA Northeast Regional Office)

MR. PARTHUM: I have also passed out to the conferees a copy of a reprint of part of the Boston sewer report which involves the proposed deep tunnel plan and we have four or five extra copies available if anyone would like to get one afterwards, but all we have is four or five.

(See appendix F or Exhibit 5 for this reprint)

I might start off by saying that the sanitary sewage, the dry-weather sanitary sewage, from the city of Boston is collected and treated by the MDC sewerage system. We are not concerned with the pollution of dry-weather sanitary sewage. The city of Boston is an old city. There are quite a few of the sewers in the city that are still being used that were constructed before the 1700's. The city of Boston has about 10,000 acres or about 15 square miles of combined sewers. Every time it rains, of course, these sewers begin to surcharge and overflow into the harbor and into the Charles River through at least 90 different outlets. Therefore, even if the dry-weather sanitary sewage is collected and treated during the rainstorms the Boston Harbor is still polluted. We have under contract with the city and have investigated four different means for collecting and handling all mixed sewage and stormwater in the city of Boston. It was evident that parts of the Chelsea, Cambridge, Sommerville and Brookline have also combined sewers and so we have looked into this problem on a regional basis.

We first investigated complete separation of the sanitary sewerage system and the stormwater collection system in the city and determined that to completely separate the systems could cost well over $500 million. We then looked into the construction of chlorination detention tanks, which meant that for the 90-odd outlets around the city perimeter, we noted that about 30 of these collected three or four into one tank and the cost of this was in excess of $400 million. The operation and the maintenance of this chlorination detention tank if they could be built - and I doubt whether you could find the land to build them on - makes the chlorination detention tanks scheme also very expensive. We then looked into the holding tanks scheme, which is no more than very large tanks that collect the excess mixed sewage and stormwater and lets it trickle back into the system during the dry weather. This was the most expensive, being well over $700 million. About the time that we started this study we became aware of a similar Deep Tunnel Plan which was proposed for the city of Chicago, and we talked with the people who proposed it, to investigate the different parts of it, and concluded that the basic scheme was what the city of Boston needed. Thus the Deep Tunnel Plan for Boston evolved.

Mr. Horsefield has a USGS map of the city, the surrounding area and the harbor. On this map we have shown in black lines the Deep Tunnel Plan. It is simply a scheme whereby all stormwater, all mixed stormwater and all mixed sewage and stormwater is discharged down into the ground, stored in large deep rock tunnels, (caverns) and pumped out, well out to sea after being screened and chlorinated. We have transmission tunnels, much smaller ones from across the Charles River up into East Boston, Sommerville, Chelsea, to pick up areas that are now combined. They come into the five large black figures shown on the plan, which are five tunnels about 300 feet down in solid rock and over 30 feet in diameter. They all come to a common point at Columbus Park. The liquid then travels to the one main storage tunnel out on Deer Island. Here a major pumping station, screening and chlorinating facility, is proposed and all of this water after being chlorinated is pumped some 9-½ miles out to sea through a 20 foot outfall. The outfall with twin 14-foot pipes has diffusers to defuse this liquid into the sea. This plan is estimated to cost at present-day prices about $430 million. A good part of this cost, over $200 million is for construction of the deep rock tunnel and we have estimated the cost based on conventional drilling and blasting. We feel that within the next five or six years that considerable headway will be made in hard rock moles of this size, such that we do not believe that the cost will increase in the next five years and it may well decrease. This Deep Tunnel Plan is, therefore, the least expensive method of eliminating all mixed sewage and stormwater from Boston Harbor. It can be expanded in any direction and it provides a natural backup to the MDC sewage system and the long 9½ miles outfall could be used by the MDC. It is all underground and there would be no digging up of streets or interference with traffic. It will take all of the stormwater and not just the overflows; it will take all of the stormwater from that portion that it serves. It will handle all of the stormwater from the storm of record in the city of Boston. If the tunnel is surcharged and it will operate under surcharged conditions, it will operate under surcharged conditions, it will handle an 8.4-inch storm that occurs in one day. Under normal operation with the tunnel not surcharged, it will handle up to five inches in a one-day storm. Incidentally, the 8.4-inch storm is well over a 100-years frequency. This plan will serve about 17,000 acres or about 27 square miles and its cost as I mentioned before is $430 million. Let me read one excerpt from this reprint. "In our opinion, it is not reasonable to expect the city of Boston alone to effectively dispose of its mixed sewage and stormwater overflows, unless neighboring cities and towns having similar combined systems and overflow problems do likewise. For this reason, as mentioned heretofore, the Deep Tunnel Plan should be constructed as a regional operation. It is our opinion that the Metropolitan District Commission or a similar agency be given the power to design, construct, operate, maintain and administer the system. Although the proposed Deep Tunnel Plan is less expensive than complete separation of the system, it nevertheless represents a considerable expenditure. At the present time, State and Federal grants do not appear adequate either in funds or in scope of the existing legislative acts to materially assist in the construction of such a proposed plan. It is our opinion that other large metropolitan cities located close to the coastline having combined sewerage systems should consider similar Deep Tunnel Plans with disposal to the ocean. A concerted effort by these large cities to join together and obtain substantial financial assistance from the Government appears to us the only feasible means for correcting the mixed sewage and stormwater-overflow problem in the larger and older cities."

I think the major thinking on the elimination of mixed sewage and stormwater pollution in Boston Harbor has been completed. We have the engineering and technology to do the job and the one big item that is missing is money. I was very glad to hear what the Lieutenant Governor said in his statement;that a committee be formed to investigate further the Deep Tunnel Plan, and Camp, Dresser and McKee is very glad to cooperate and assist this Committee or any other committee in its investigation. Thank you.

CHAIRMAN STEIN: Thank you, sir. Are there any comments or questions?

MR. KLASHMAN: I first want to compliment your firm on the imagination that you have shown in coming up with this proposal. Do I understand correctly that at Deer Island you would pump from 300 feet below the ground up to ground level and then you would chlorinate the water and remove the solids and then chlorinate it, is that correct?

MR. PARTHUM: The mixed sewage would be screened and chlorinated and pumped at this point.

MR. KLASHMAN: Is the outfall large enough to take the primary effluents from the Deer Island and Nut Island sewage?

MR. PARTHUM: Yes, sir. Under maximum storm conditions we might be pumping 52 cfs and that is still a good deal more than what the average daily flow is to the treatment plant.

MR. KLASHMAN: The other question I want to ask you and have you tell me your thinking on is how you are going to keep the solids cleaned out of the big tunnel?

MR. PARTHUM: That is a very good question. The tunnel, as we see it now, will be about 30 to 33 feet in diameter. If it is drilled with a mole it will be relatively smooth - a smooth bore. If it is drilled and blasted, we feel that the bottom 1/3 must be paved with concrete with a V shape or some similar shape to flush out the solids during the last part of the emptying of the tunnel.

MR. KLASHMAN: In other words, self-cleaning in the latter case?

MR. PARTHUM: Yes, to the extent possible. The paving of the bottom of the tunnel will also assist the contractor in the building of the facility, and it will also assist in operation and maintenance of it throughout its life. In other words, you will be able to drive a truck up these different tunnels.

MR. KLASHMAN: You will have to have some type of ventilation?

MR. PARTHUM: Yes, you would.

MR. KLASHMAN: Well, the ventilation and the amount of air that will be required for ventilation is such that it will work?

MR. PARTHUM: Yes, as I understand it, contractors in deep tunnel work use electrical power, electrical trucks, and that doesn't mean that gasoline power could not be used here. We will need adequate ventilation during construction and afterwards.

MR. KLASHMAN: The ventilation is really no different than when you are drilling.

MR. PARTHUM: No, it shouldn't be.

MR. KLASHMAN: Thank you very much.

CHAIRMAN STEIN: Any further questions? I notice one difference between this and the Chicago plan - the Chicago Deep Tunnel is going to feed this stuff back into the treatment plant and run it through the treatment plant?

MR. PARTHUM: We considered storing all of this mixed sewage and stormwater at the surface at Deer Island and it would involve about 130 acres or 140 acres of storage about 30 or 40 feet deep. It would have eliminated the house of correction over there, and we would have to take the whole island, and the cost would have been more than the cost of building the outfall of 9-½ miles.

CHAIRMAN STEIN: The Chicago group is going to store it underground until they need it, until the rain stops and then get it to the treatment plant. In other words, they are going to use the tunnel as a storage tank.

MR. PARTHUM: Chicago has in their plan storage, pumping up to the surface and then treating it. The modification that we have made is we are near the ocean, and we feel if it is screened and chlorinated and pumped 9-½ miles out to sea, that gets rid of it once and for all.

MR. KLASHMAN: What is the effect of the discharge of this 9-½ miles out to sea on the beaches and the coastal areas in this study you have made?

MR. PARTHUM: From our studies there will not be any effect on the coastline; none of this will ever come back in.

CHAIRMAN STEIN: Are there any further questions or comments?

MR. McMAHON: Mr. Parthum, as I recall this is the third stage of general recommendations to the city and there are two earlier steps that are recommended in the report?

MR. PARTHUM: Well, our report has an initial construction phase and that is involved with fixing up some of the older, large intercepting sewers that need repair; and the second stage would be other repairs and enlargement; and this is not as critical as the initial stage. The Deep Tunnel Plan is in our minds the final solution to the pollution problem and, of course, it cannot be built until the money is available.

CHAIRMAN STEIN: Thank you. Are there any further comments or questions? Thank you.

MR. McMAHON: Mr. Chairman, I would like to call on Mr. James Reid, Assistant Building Commissioner for the city of Boston.

JAMES REID

ASSISTANT BUILDING COMMISSIONER

CITY OF BOSTON

BOSTON, MASSACHUSETTS

MR. REID: You have a copy of our survey report and I will read the conclusions of the report only.

CHAIRMAN STEIN: Without objection the report will be included as if read.

MR. REID: As to the testimony of the consulting firm most of the conclusions have been borne out by their report, and I would like to state that Mr. Henry Bryson was assigned to this project about a year ago, and at the invitation of Mr. Callaghan of the Port Authority, did come to the conclusion recently, and I would like to read a couple of them. He states that the "Water pollution abatement is a municipal, State and industry responsibility but because the national interest is heavily involved, it is also a Federal responsibility. The ultimate role of the Federal Government in this field will be determined by the kind of job the municipalities, the States and industries are able and willing to do."

He then goes on to talk about the funds. I would like to state that, at the moment, we have no private buildings within the scope of the Boston building code now discharging sewage into the harbor. It has taken us about a year, and I have allowed the involvement of inspectors from my department to be extended not within the confines of our code but in the interest of: 1) regional development, and 2) the Mayor's high interest in the benefits of all the people within the residential area of Boston and at no time voiced any objection to the building department's funding money be spent in an area where we didn't properly belong. As a result of this, I repeat we have no private buildings which are actively contributing to the pollution in the harbor. We broke our survey into two parts. The first one was with solid pollution, and every building that was contributing siding, foundation material, roofing material to the harbor had a complaint filed against it and compliance was secured. This is not to say that there are no discharges to the pollution, but there are no buildings within the scope of this code, and, ironically, this includes some city authority and State-owned wharves. Number 2, on liquid pollution we have run, for the past year, dye tests and we find we have no known contributors of liquid pollution to the pollution. Practically our part in this survey could be considered finished if it weren't for the contributing factors from outside the scope of our control which complicate our problem.

Number 1, the tributaries to the harbor, we find municipalities using the rivers like Mystic, the Charles and the Neponset in particular as sewers and paying no cost of sewer use which they receive from the river. We can talk about a deep tunnel plan all day and talk about treatment plants and talk about holding tanks, but as long as one city or town which abutts to one of the rivers - which ultimately discharges to the harbor - insists on using our natural resource as their open sewer, it is a waste of money.

In the conclusion which we reached I find that everyone connected can commiserate with the clams, the trout, the salmon - and I heard a very learned dissertation on herring which I enjoyed - but no one commiserates with the people. We know the results of the pressure on the ghettos, and this is a very real problem with us in Boston. If one civil disturbance starts, it is not the Federal Government that is called upon in our case; it is the city agencies which are called upon to take active steps to prevent the repetition. I maintain that the small beach areas available to the residents of Boston, in general, and in ghetto areas in particular, have a high degree of pollution, and I will quote from your own survey where you state this very conclusion - that the harbor is grossly polluted. I use the beaches, and I don't have to be any chemist to tell me that they are polluted. Last year I found it necessary after using one of the beaches to scrub down myself and my children because I was quite fearsome of the results.

I heard reference to salmonella. In one instance that occurred in a dry milk plant in the midwest, immediately the Food and Drug Administration pushed the panic button and a major company nearly was bankrupted. Yet the experts testify of the presence of this disease and no one gets alarmed. I wish I could remain as calm, but I am personally angry at all the causative factors being forced into the Boston area, the harbor in particular, which is increasing the pressure upon the poor. I say this because I use the same beaches; and if we don't give them reasonable outdoor recreational facilities and harbor beaches, they will find it elsewhere.

Now, in the interim, with the five-year projection for the sewage plant, it is encumbent upon some agency - and I know it is not on mine - to make available the bacteria count at the public beaches. I have never seen any reference in the newspapers that on a particular day that City Point is polluted or Carson Beach has a high count, and the people are never given the opprotunity to make the judgement for themselves whether they wish to swim in sewage.

Our harbor is a cesspool. This report states that Boston receives sewage discharge of 2½ million people. The second conclusion that you can draw is that Boston Harbor is a cesspool.

The last conclusion you can make is that the people of Boston are being required to swim in the cesspool that belongs to everybody; and if they don't have the means to go to the beaches outside of the harbor area, someone in authority must state that either the beaches be closed down, in the interest of the public health, or make a false statement that they are fit to swim in it.

Thank you very much.

CHAIRMAN STEIN: Thank you, Mr. Reid, for a very excellent statement.

("Boston Building Department Progress Report on Harbor Pollution Survey" follows.)

CHAIRMAN STEIN: Are there any comments? There was a point that Mr. Reid made, and I think we thoroughly agree, that we have talked to people on the subject of boat pollution, deep tunnel and oil pollution, but the basic facts of pollution are these big shore installations within the city and industries pouring their wastes into the water either untreated or inadequately treated. You are right - until you meet that problem first, you are not going to clean up the pollution problem.

There is one other thing that I want to take up in your statement. Beach pollution isn't necessarily unique within your jurisdiction. I have been in many pollution cases throughout the country and I can tell you that as far as the beaches are concerned, unless you can use those beaches, you haven't cleaned up the pollution. This is the test that they put on this. Now, I do know - and I sympathize with you, Mr. Reid - about the problem of getting bacteria counts for the beaches. I realize it is not a simple one and it is not easy for a city to do it. Where we have jurisdiction - and we have this same problem that you have here in Chicago - the beaches which were closed were the most polluted, and we took the bit in our teeth and we examined the bacteria count at

CITY OF BOSTON
BUILDING DEPARTMENT
OFFICE OF THE BUILDING COMMISSIONER
NINTH FLOOR, CITY HALL ANNEX
BOSTON, MASSACHUSETTS 02108

RICHARD R. THUMA, JR.
Building Commissioner
THOMAS L. FLYNN
Deputy Building Commissioner

FRANK J. COUGHLIN
Assistant Building Commissioner

ADDRESS REPLY TO
THE BUILDING COMMISSIONER

May 20,1968

Mr. Thomas P. Callaghan
Harbor Pollution Committee
Massachusetts Port Authority
Boston, Massachusetts

ref; BOSTON BUILDING DEPARTMENT PROGRESS REPORT ON HARBOR POLLUTION SURVEY

Dear Sir:

As a result of conferences with the Boston Harbor Pollution Committee and the State Division of Water Pollution Control, the Boston Building Department agreed to cooperate and conduct a comprehensive water pollution abatement program of the Boston Harbor and its tributaries that are within the limits of the City of Boston.

The area to be inspected includes:

a. 30 lineal miles of harbor shoreline properties.
b. 9 lineal miles of Neponset River shoreline properties
c. 10 lineal miles of Charles River shoreline properties
d. 3 lineal miles of Chelsea River shoreline properties
e. 2 lineal miles of Mystic River shoreline properties
f. 2 lineal miles of Mother Brook shoreline properties
g. 2 lineal miles of Belle Island Inlet shoreline properties
h. 3 lineal miles of Back Bay Fens shoreline properties
i. 10 lineal miles of harbor island shoreline properties

TOTAL: 71 lineal miles of shoreline to be inspected. All of this shoreline is within the limits of the City of Boston, and there are 699 properties and buildings that abut on the 71 miles of shoreline. These properties and buildings are possible sources of raw sewerage, chemical and solid pollution of the adjoining waterway.

About 30% of the above mentioned shoreline, properties and buildings do not come under the scope of the City of Boston Building Code and the inspection team is not authorized to inspect them nor can the City of Boston take legal action to prosecute violators and oblige them to eliminate sources of water pollution.

SCOPE OF CITY OF BOSTON BUILDING CODE

Section 107:" The provisions of this code shall apply to every building or structure hereafter erected in the City of Boston, except public highway, railroad or railway bridges or trestles, quays or wharves, buildings owned and occupied by the United States or the commonwealth, railroad structures and stations used primarily for railway purposes, voting booths erected and maintained by the board of election commissioners, prefabricated metal tanks of less than five thousand gallons capacity and tanks exceeding ten thousand gallons capacity for liquids other than water, tunnels constructed and maintained by a public authority, tents covering an area less than one hundred square feet, fences less than six feet high, signs or billboards upon the ground and signs less than one square foot in area, upon or attached to the outside of a structure and flagpoles less than twenty feet in length."-

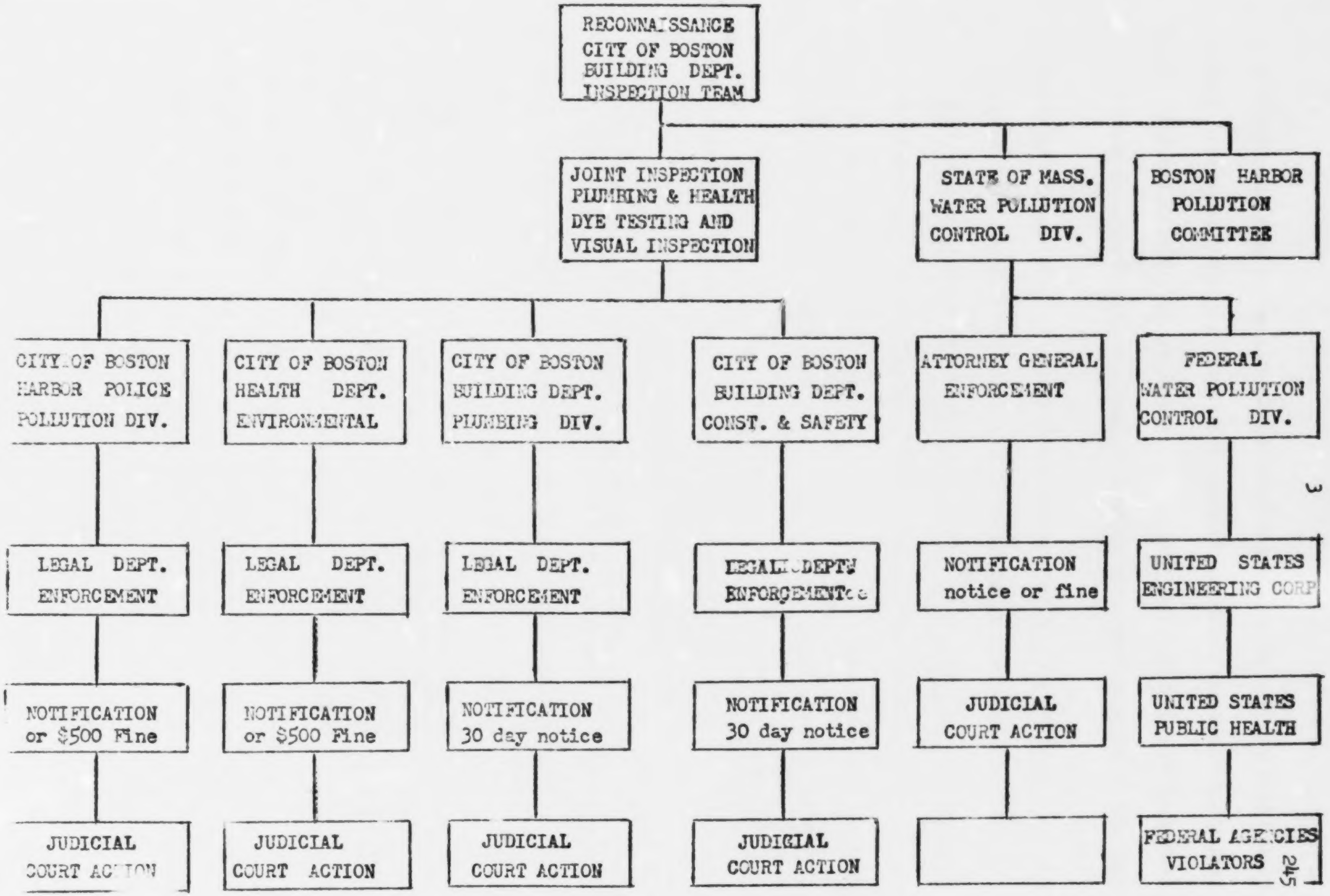
Due to the limitations imposed by the Boston Building Code, the inspection team,s activities are restricted to the following:

48.93 lineal miles of shoreline properties

489 residential, commercial and industrial buildings

The inspection team will visually inspect exteriors of all State, Federal and public utility properties from a police boat and report all violators to the Boston Harbor Pollution Committee and the State Water Pollution Control Division.

BOSTON BUILDING DEPARTMENT,S HARBOR POLLUTION ABATEMENT PROGRAM--- (FLOW CHART FOR PROCESSING HARBOR POLLUTION VIOLATIONS


RECONNAISSANCE CITY OF BOSTON BUILDING DEPT. INSPECTION TEAM
JOINT INSPECTION PLUMBING & HEALTH DYE TESTING AND VISUAL INSPECTION
STATE OF MASS. WATER POLLUTION CONTROL DIV.
BOSTON HARBOR POLLUTION COMMITTEE
CITY OF BOSTON HARBOR POLICE POLLUTION DIV.
CITY OF BOSTON HEALTH DEPT. ENVIRONMENTAL
CITY OF BOSTON BUILDING DEPT. PLUMBING DIV.
CITY OF BOSTON BUILDING DEPT. CONST. & SAFETY
ATTORNEY GENERAL ENFORCEMENT
FEDERAL WATER POLLUTION CONTROL DIV.
LEGAL DEPT. ENFORCEMENT
LEGAL DEPT. ENFORCEMENT
LEGAL DEPT. ENFORCEMENT
LEGAL DEPT. ENFORCEMENT
NOTIFICATION notice or fine
UNITED STATES ENGINEERING CORP
NOTIFICATION or $500 Fine
NOTIFICATION or $500 Fine
NOTIFICATION 30 day notice
NOTIFICATION 30 day notice
JUDICIAL COURT ACTION
UNITED STATES PUBLIC HEALTH
JUDICIAL COURT ACTION
JUDICIAL COURT ACTION
JUDICIAL COURT ACTION
JUDICIAL COURT ACTION
FEDERAL AGENCIES VIOLATORS

ORGANIZATION: One Construction and Safety Inspector and one Plumbing Inspector has been assigned to the department,s harbor pollution abatement program. The Building Department,s budget does not allow that these inspectors be assigned on a permanent basis to the abatement program.

RECONNAISSANCE PROCEDURES: The reconnaissance procedures of the water pollution abatement program are divided into two phases. They are:

PHASE NO. 1: INSPECTION OF SHORELINE PROPERTIES FROM A POLICE BOAT

During the Summer of 1967, the Building Departments inspection team conducted an inspection survey of 71 lineal miles of shoreline within the limits of the City of Boston. Observations were made of the following sources of water pollution:

a. Raw sewerage discharges from residential, commercial and industrial properties.

b. Raw sewerage discharges from MDC and municipal storm sewer overflows.

c. Sources of petroleum pollution

d. Sources of chemical pollution

e. Sources of solid pollution; namely, dilapidated piers, wharves, buildings, and rubbish disposal facilities.

PHASE NO. 2: FINAL INSPECTION OF ALL PROPERTIES UTILIZING DYE TESTING

This is the final stage of the inspection activities and it was initiated on May 1,1968. The procedures requires the dye testing of plumbing installations of all buildings that abut on Boston Harbor and its tributaries. It requires at least 4 hours to run a dye test on an average size building and usually is performed on out-going tide.

At the present rate of progress on a part time basis, it will require 4 years to check-out every building on Boston,s shoreline.

RESULTS OF PHASE 1 OF HARBOR POLLUTION RECONNAISSANCE PROGRAM

BREAKDOWN OF SOURCES OF LIQUID & SOLID POLLUTION OF HARBOR & TRIBUTARIES

SOURCE OF POLLUTION	SOLID POLLUTION % of total	CHEMICAL POLLUTION % of total	PETROLEUM POLLUTION % of total	RAW SEWERAGE POLLUTION % of total
FLOATING CRAFT				
Oil Tankers	1%	[illegible]	51%	1%
U.S. Naval Craft	5%	2%	4%	10%
Pleasure Craft	2%		2%	2%
U.S. Army Craft	2%		2%	2%
Fishing Fleet	5%		3%	2%
Cargo-Passenger Ships	6%		5%	3%
SHORE INSTALLATIONS				
INDUSTRIAL (Boston)	5%	10%	4%	2%
INDUSTRIAL (Municipalities)	10%	25%	11%	4%
COMMERCIAL (Boston)	5%	5%	4%	2%
COMMERCIAL (Municipalities)	5%	3%	4%	4%
Navy Properties	11%	5%	8%	4%
Army Properties	5%	1%	2%	3%
State Properties	1%			1%
Piers and Wharves; State	15%			
Piers and Wharves; Govt.	3%			
Rubbish Disposal; Burning	12%	3%		
Municipal Dumps	7%	5%		
MBTA		2%		
Railroads		2%		
SEWERAGE SYSTEMS				
City of Boston; Overflows		10%		18%
MDC-Overflows		15%		30%
Municipalities		12%		12%
TOTAL	100%	100%	100%	100%

The above calculations have been made by taking into condideration that the Deer Island Sewerage Plant is treating all sewerage processed through the facility and that the Moon Island Sewerage has been diverted to the Deer Island Plant.

RESULTS OF PHASE 1 OF HARBOR POLLUTION RECONNAISSANCE PROGRAM; Cont.

The breakdown on the preceeding page demonstrates the sources of harbor pollution that are the direct responsibility of the City of Boston are:

SOURCE OF POLLUTION	SOLID POLLUTION % total pollution	CHEMICAL POLLUTION % total pollution	PETROLEUM POLLUTION % total pollution	RAW SEWERAGE % total pollution	ENFORCEMENT AUTHORITY
Sewerage Overflows		10%		18%	Sewer Dept
Industrial Properties	5%	10%	4%	2%	Police Dept. Health Dept. Building Dept Sewer Dept.
Commercial Properties	5%	5%	4%	2%	Building Dept Police Dept. Health Dept.
Oil Tankers	1%		51%		Police Dept Coast Guard
Pleasure Craft	2%		2%		Police Dept Coast Guard
Cargo Passenger Ships	6%		5%	3%	Police Dept Coast Guard
Fishing Fleet	5%		3%		Police Dept Coast Guard
Rubbish Disposal; Burning	12%				Police Dept Coast Guard
Municipal Dumps	7%	5%			Police Dept Health Dept
MBTA		2%			Police Dept Health Dept
RAILROADS		2%			Police Dept Health Dept
TOTAL ENFORCEMENT RESPONSIBILTY OF THE CITY OF BOSTON	43%	34%	69%	25%	

A crash abatement program of one year duration,which would check-out the 48.93 lineal miles of shoreline properties and 489 residential, commercial and industrial buildings, would require an expenditure of $ 98,000 by the City of Boston. The city does not have the necessary funds to finance this project. A breakdown of the cost of the abatement program is:

PERSONNEL	AREAS TO BE SURVEYED AND CHECKED OUT	COST FOR 1 YEAR
2 Inspectors	South Boston & Dorchester Shoreline Area	$ 13,000.00
2 Inspectors	Neponset River & Mother Brook Shoreline	$ 13,000.00
2 Inspectors	East Boston Shoreline Areas	$ 13,000.00
2 Inspectors	Charles & Mystic River Shoreline	$ 13,000.00
2 Inspectors	Boston Proper Waterfront Area	$ 13,000.00
2 Inspectors	Charlestown Waterfront Area	$ 13,000.00
	Administrative Expenses	$ 10,000.00
	Dye Chemicals used in Dyetesting	$ 6,000.00
	Rental of Shallow Draft Launch	$ 4,000.00
12 Inspectors	Total Cost	$ 98,000.00

This disbursement will cover all expenses involved in the water pollution abatement reconnaissance program conducted by the City of Boston, but as stated before, will only include 70% of the shoreline properties within the City of Boston. The remaining shoreline area (30%) are under the jurisdiction of the State and Federal Government. If it is decided that the City of Boston inspect these properties, the expenditure would have to be increased by 30% or $ 29,400.00.

The City of Boston does not have any budget appropiation for water pollution abatement programs and any program will have to be financed by the State or Federal Government. Recent leglislation makes available funds to municipalities that cooperate in water pollution abatement programs;

The Federal Water Pollution Control Act states " DECLARATION OF POLICY; In connection with the exercise of jurisdiction over the waterways of the Nation and in consequence of the benefits resulting to the public health and welfare by the prevention and control of water pollution, it is hereby declared to be the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights of the States in preventing and controlling water pollution, to support and aid technical research relating to the prevention and control of water pollution, and to provide Federal technical services and financial aid to State and to interstate agencies and municipalities IN CONNECTION WITH THE PREVENTION AND CONTROL of water pollution. The Secretary of the Interior shall administer this Act through the Administration created by section 2 of this Act, and with the assistance of an Assistant Secretary of the Interior designated by him, shall supervise and direct the head of such Administration in administering this Act. Such Assistant Secretary shall perform such additional duties and functions as the Secretary may prescribe "-----

COMMONWEALTH OF MASSACHUSETTS; 1966; An act establishing a Water Pollution Control Division in the Department of Natural Resources; Whereas.the deferred operation of this act would tend to defeat its purpose, which , in part, is to provide funds immediately for the water pollution control program for the commonwealth, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience and public health

SECTION 1; GENERAL LAWS OF MASSACHUSETTS; Section 27; It shall be the duty and responsibility of the Division of Water Pollution Control to enhance the quallity and value of water resources and to establish a program for the prevention, control and abatement of water pollution. Said Division shall;

1. Encourage the adoption and execution by cities and towns , industries and other users of the waters of the commonwealth, and by co-operative groups of municipalities and industries, of plans for the prevention , control and abatement of water pollution.
2. Cooperate with appropiate federal agencies or the agencies of other states, or with interstate agencies in matters relating to water quality control, and shall receive and dispense such funds from any such agency as may be available for the prevention, control and abatement of water pollution. Said Division shall also cooperate with and assist departments, boards, officials and institutions of the commonwealth or its political subdivisions that may be concerned in ANY WAY with the problem of water pollution. -----

The Clean Water Restoration Act of 1966 authorized the appropiation of 3.9 billion dollars for construction grants to build sewerage treatment plants and for State Water Pollution Control. The new Act continues the present $ 20,000,000 a year program for projects by States and Municipalities to provide improved ways of handling the combined sanitary and storm sewer problem. Also, the Federal Government can now pay 75% of project cost. The new act also authorizes $10,000,000 grants to States and municipalities to enable them to expand and improve their water pollution control programs, including the training of needed personnel

CONCLUSION: Water pollution abatement is a municipal, State and industry responsibilty but because the national interest is heavily involved, it is also a Federal responsibilty. The ultimate role of the Federal Government in this field will be determined by the kind of job the municipalities, the States and industries are able and willing to do.

With funds available from the Federal Government now, each State and Municipality are spending enormous sums of money on research and planning programs but are not doing anything to eliminate the pollution of the waterways by defective operating sewer systems, and by the discharge of raw sewerage, chemicals, etc. We should dedicate the funds and activities to the elimination of illegal discharges and the repair and modification of our present sewerage systems. The only way this abatement program can be accomplished is by the State and Municipal governments establishing a comprehensive, planned program of inspection and enforcement of the water pollution laws. This cannot be done from an office. Teams of inspectors, State and Municipalties, will be required to visually inspect the shorelines of all waterways, run chemical dye tests in plumbing installations, chemical dye tests in sewer systems and in some cases perform biological sampling of the sources of pollution. Until the discharge of raw sewerage and chemicals is stopped from residential, commercial and industrial installations, it would be of no avail to construct a 495,000,000 dollar deep tunnel project for the City of Boston.

If the City of Boston had sufficient personnel to work on a comprehensive water pollution abatement program we could eliminate about 7% of the raw sewerage pollution, 10% of the chemical pollution, and 7% of the solid pollution of the harbor and its tributaries, and if the Sewer Division of the City of Boston obtained sufficient appropiations it could eliminate an additional 15% of the raw sewerage discharge from its sewerage system into the waterways.

There are many advocates for the installation of a complete separation sewerage system for the City of Boston. This sytem is the most effective and positive methods of separating sanitary sewerage and storm drainage. Separation, if accomplished , would eliminate all discharges of overflows of mixed sewerage and storm water. In Boston where systems are combined, this would require the construction of a sanitary sewer in every street where a combined sewer now exists. It would also involve new separate plumbing connections to all of the existing buildings, and the replumbing of many entire buildings to separate roof drainage from the sanitary sewerage discharge system. In many areas, yard drainage which now discharges into the combined system would also have to be repiped to the separate storm water system. The construction of new separate sanitary sewers in the combined areas of the city would require the digging-up of every street and result in enormous traffic problems that would interfere with every day activities. New sanitary sewers would be required to serve 7000 acres in Boston, and an additional 5,000 acres in the regional areas.

It is not considered feasible or practical to complete separate existing building plumbing into separate sanitary and storm systems. The great problem of enforcement of such a separation would have to be carried out under city ordinance by teams of inspectors. The only other possible way to affect separation of building plumbing would be for the City to go into each building and accomplish the separation themselves

CITY OF BOSTON
BUILDING DEPARTMENT

May 20,1968

SUBJECT: SUMMARY OF HARBOR WATER POLLUTION RECONNAISSANCE PROGRAM

The scope of this summary report is confined to the liquid pollution of Boston Harbor and its tributaries and the liquid pollution classification are divided into 3 catagories, namely;

1. Raw sewerage pollution
2. Chemical Pollution
3. Petroleum Pollution

RAW SEWERAGE POLLUTION

At the present time, there are about 1360 miles of sewers in the City of Boston, many of which were built over 100 years ago. Most of these sewers, particulary in the older sections of the city, are combined, and their condition is questionable. Much of this system is overloaded and several sections have collapsed.

There are many outlets into Boston Harbor and adjacent waters, including the Charles River, Mystic River, Neponset River and the Chelsea River. It is estimated at the present time that there are about 90 outlets in Boston which discharge dry weather flows of sewerage continuously or mixed sewerage and storm water during wet weather. Most of these outlets are old and do not function effectively. A few of the operating defects of the storm sewers are:

NUMBER OF ~~DEFECTIVE~~ OUTLETS	CAUSE OF MALFUNCTION
28	Tide gates are missing
79	Tide gates are inoperative. Stuck open or closed by heavy build-up of debris and sludge
74	Moderate to heavy sludge build-up in Regulator and tide gate chambers.

cont.

NUMBER OF DEFECTIVE OUTLETS	CAUSE OF MALFUNCTION
51	Dry weather connections are blocked and all flow is being discharged to harbor or rivers.
73	Regulators, tidegate chambers and interceptors surcharged with considerable backflow at high tides resulting in sewerage discharge at outgoing tides.

A conservative estimate would be that the above mentioned conditions of the MDC and the City of Boston sewerage system contribute about 50,000,000 gallons of raw sewerage into Boston Harbor and its tributaries every day. It is the major source of water pollution, especially in the Inner Harbor, Charles River, Neponset River, Mystic River and the Chelsea River, and the complete treatment of raw sewerage by the Deer Island Plant will not lower the biological contamination of these waters.

The proposed deep tunnel plan is a long range program that will cost about 496,000,000 dollars. It will take about 5 years to construct. The project involves the construction of large tunnels in rock under the city into which all of the overflows can be discharged through vertical shafts. The tunnels will store and conduct the overflows to a point where they can be pumped and disposed of in an acceptable manner, preferably by means of an ocean outfall but still there would have to be additional expenditures to repair and modify the present sewerage system of the city and the MDC.

An alternative method would be to redesign, modify and maintain the present sewerage system, including the repair or replacement of all defective tide gates, unblock all dry weather outlets that are blocked-up, install new tide gates where needed, clean-out debris and sludge from present tide gate chambers and regulators, and if necessary construct holding tanks at stragetic locations. This project would cost about $100,000,000, and with the exception of the holding tanks, will have to be done anyways no matter which plan is utilized.

The holding tank system is a method of handling mixed sewerage and storm water discharges and involves construction of holding tanks in the vicinity of selected outlets, which would store the discharges or overflows until the storm subsides or the dry weather peak flows diminish. The stored flows could then be released back into the dry-weather interceptor system for disposal with the normal sewerage flow.

A similiar system could be installed where the holding tanks adequately chlorinate the discharges or overflows of dry weather flow or mixed sewerage and storm water before discharging to nearby watercourses. This would remove bacteria and viruses.

If it is feasible, a study could be made to ascertain if the Roxbury Conduit Canal, a 10 foot by 20 foot conduit, almost a mile long, that extends from Massachusetts Ave. to the Dover St. Bridge. Its capacity (storage) is about 128,000,000 gallons, could be utilized as huge holding and/or chlorinating tank. At the present time it is probably discharging a mixture of raw sewerage and biologically contaminated sea water to the extent of 15,000,000 gallons daily.

A recent sampling of the Fort Point Channel which receives the discharge of the Roxbury Conduit Canal showed the highest degree of pollution anywhere in Boston Harbor, organic carbon 23.5 and organic nitrogen 1.29. Such values are not unlike those associated with raw wastes from packinghouses which could be attributed to the direct discharge or overflow of the City Hospital sewerage and mortuary residues. Sludge deposits in the Fort Point Channel are 3 feet thick, and contain oily residue and emit foul odors. Hydrogen sulfide bubbles effervesed from the sludge, rose to the surface and burst, creating readily apparent odors like those of raw sewerage and rotten eggs. Not even pollution resistant worms can live in the bottom of Fort Point Channel, let alone fish.

EXTENT OF BIOLOGICAL POLLUTION OF BOSTON HARBOR

There exists many outlets for the discharge of mixed sewerage and storm water into the Charles River, Mystic River, Chelsea River and the Neponset River. Unless all discharges containing sewerage are prevented, the basic problem of eliminating pollution from Boston Harbor and all adjacent waters will not be solved. A joint effort by Boston, Brookline, Cambridge, Chelsea, Somerville, Revere and municipalities upstream appears essential. A typical example is as follows:

The Massachusetts Water Pollution Control has established safe water quality standards and insist that the Coliform bacteria per ml should not exceed 1000 average value during any monthly sampling. If the coliform bacteria count exceeds 1000 it is not recommended for bathing. The Public Health Dept. of the Federal Govt. suggests the fecal coliform count should not exceed 200 in waters utilised for bathing purposes.

Water sampling obtained near the outfall of the Deer Island Sewerage plants show an average total coliform bacteria count of 53,258 and an average fecal coliform count of 6,782. The following chart will demonstrate that the major sources of pollution are its tributaries:

LOCATION	Total Coliform	Fecal Coliform
State Water Standards for Bathing	not over 1000	
U.S.Public Health Standards "		not over 200
Chelsea River; Broadway Bridge	91,306	3,908
Deer Island Sewerage Outflow	53,258	6,782
Mystic River; Route 16 Bridge	33,672	983
Neponset River; Milton	14,224	485
Malden River; Parkway Bridge	20,691	508
Convergence of Charles, Mystic & Chelsea Rs.	98,962	8,735

The preceeding chart was based on the average total coliform and fecal coliform count. The following chart shows the maximum coliform sampling count obtained at the various locations:

LOCATION	Total Coliform	Fecal Coliform
State Water standards for bathing	not over 1000	
U.S. Public Health standards *		not over 200
Deer Island Plant Sewerage Outlet	920,000	540,000
Convergence of Charles, Mystic, Chelsea Rs.	2,400,000	80,000
Neponset River; Milton	110,000	2,500
Chelsea River at Broadway Bridge	1,500,000	40,000
Mystic River at Route 16	1,700,000	51,000
Malden River at Parkway	140,000	14,000

The above two comparision charts clearly demonstrate that the outflows of the Charles, Mystic and Chelsea are more polluted than the untreated raw sewerage discharge of the Deer Island Sewerage Plant. All of this pollution is caused by sewerage discharge from MDC sewer system, and in a few cases, from adjoining comunities. The deep tunnel plan will not abate this pollution. (Note: The above mentioned water samplings were obtained by the Federal Water Pollution Control Administration of the Dept. of Interior during the Summer of 1967.)

Water polluted by sewerage generally contains large numbers of coliform bacteria that occur typically in feces or excreta. These bacteria while not usually harmful in themselves, are used as an indicator organisms of the probable presence of pathogenic bacteria. These pathogenic bacteria, if ingested, can cause gastro-intestinal diseases, such as typhoid fever, dysentry and diarrhea. As the densities of pathogenic bacteria are reduced through waste treatment, the hazards of contracting disease are proportionately reduced. The presence of fecal bacteria is positive proof of fecal pollution and indicative of hazardous contamination .

The recent survey by the Water Pollution Control Agency shows the extent of pollution of Boston Harbor in the following summary:

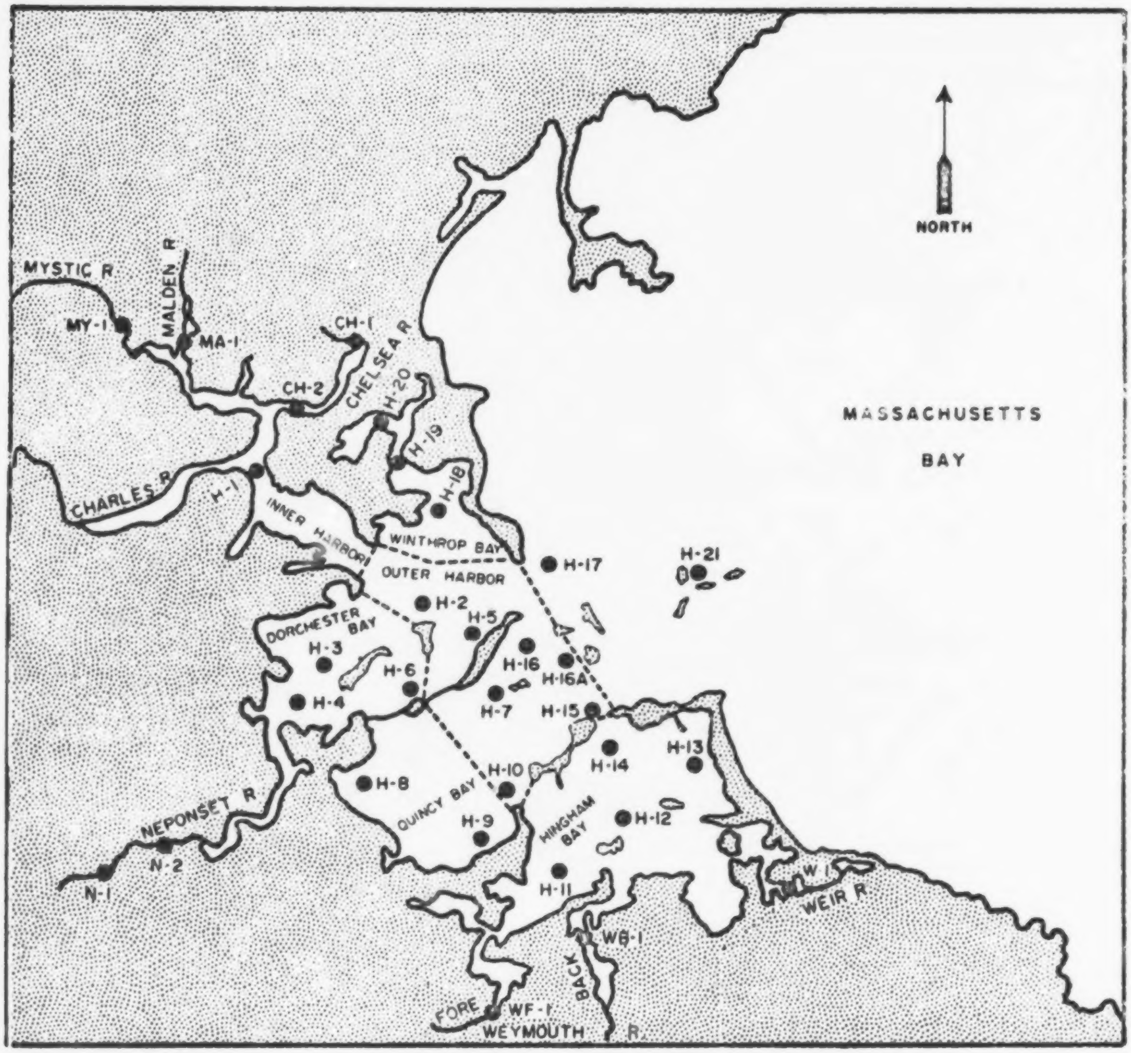

NORTH
MASSACHUSETTS
BAY
MYSTIC R.
MALDEN R.
MY-1
MA-1
CH-1
CHELSEA R.
CH-2
H-20
H-19
H-18
H-1
CHARLES R.
INNER HARBOR
WINTHROP BAY
OUTER HARBOR
H-17
H-21
DORCHESTER BAY
H-2
H-5
H-3
H-6
H-16
H-16A
H-4
H-7
H-15
H-13
H-14
H-10
H-8
QUINCY BAY
H-9
HINGHAM BAY
H-12
NEPONSET R.
N-2
N-1
H-11
W-1
WEIR R.
WB-1
BACK
FORE
WF-1
WEYMOUTH
R.

FIGURE 9 STATION LOCATIONS IN BOSTON HARBOR AND TRIBUTARIES.

Table 1-A (cont.)

REFERENCE POINT LOCATIONS

Boston Harbor-Charles River Study
Massachusetts

Sample Sta. No.	Description
	Mystic River
MY-1	Mystic River Parkway (Rt. 16) bridge, Medford
	Malden River
MA-1	Revere Beach Parkway bridge, Medford
	Chelsea River
CH-1	Broadway St. bridge, Chelsea
CH-2	Meridian St. bridge, East Boston
	Neponset River
N-1	Neponset Valley Parkway (Milton St.) bridge, Milt
N-2	Central Ave. bridge, Milton
	Weymouth Fore River
WF-1	Quincy Ave. bridge, Braintree
	Weymouth Back River
WB-1	Lincoln St. bridge, Hingham
	Weir River
W-1	George Washington Blvd. bridge, Hingham

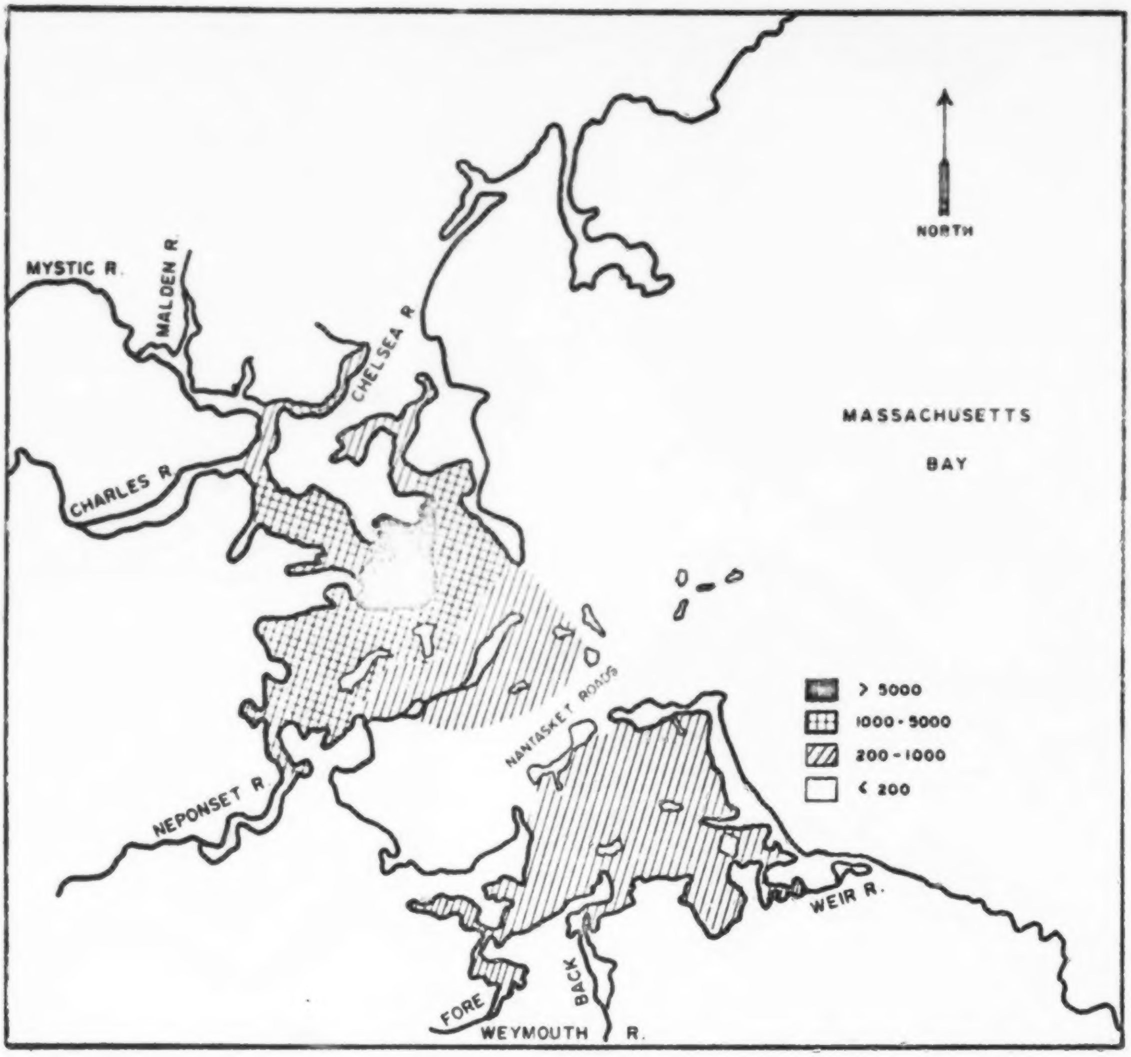

NORTH
MYSTIC R.
MALDEN R.
CHELSEA R.
CHARLES R.
MASSACHUSETTS BAY
NANTASKET ROADS
NEPONSET R.
WEIR R.
FORE
BACK
WEYMOUTH R.
> 5000
1000 - 5000
200 - 1000
< 200

FIGURE 10. NUMBER OF POLYCHAETE WORMS PER SQUARE FOOT, BOSTON HARBOR AND TRIBUTARIES, JULY-AUGUST, 1967.

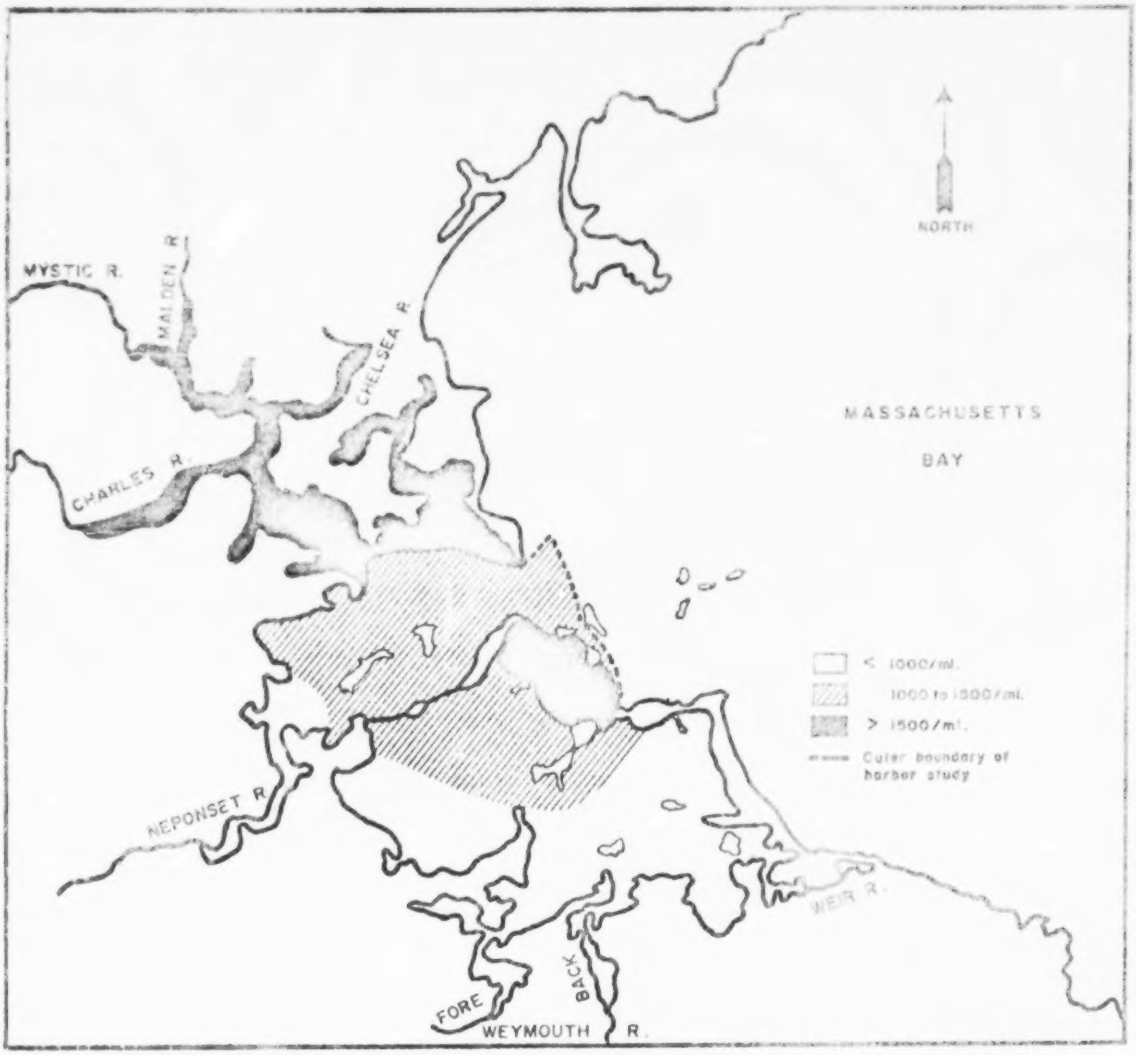

NORTH
MYSTIC R.
MALDEN R.
CHELSEA R.
CHARLES R.
MASSACHUSETTS
BAY
< 1000/ml.
1000 to 1500/ml.
> 1500/ml.
Outer boundary of harbor study
NEPONSET R.
WEIR R.
FORE
BACK
WEYMOUTH R.

FIGURE 11. AVERAGE NUMBER OF PHYTOPLANKTON (number/ml.), IN BOSTON HARBOR, AUGUST, 1967.

1. The Charles River is the principal tributary of Boston Harbor. It begins about two miles upstream from Milford, Massachusetts and follows a general northeasterly direction for about eighty miles to Boston. Studies of bottom associated aquatic life, nutrients, aquatic plants and river deposits showed water quality degradation and sludge deposits from wastes originating in Milford and with additional waste contributions in downstream reaches, polluted conditions also extended through Medfield, a distance of 32 stream miles.
2. Improved conditions in the Charles River existed from South Natick to Wellesley as evidenced by a predominance of clean water bottom animals; however, nutrients from upstream sources caused dense growths of rooted aquatic plants and phytoplankton in the improved reaches.
3. Combined sewers discharged to the Charles River over a distance of 15 miles in the Boston Metropolitan area ultimately caused severely degraded water in most downstream segments of the river.
4. A total of 75 stream miles of the Charles River was damaged by the discharge of inadequately treated waste waters.
5. The Charles River discharged severely polluted water to Boston Harbor.
6. Boston Harbor is approximately 44 square miles in area. It has salinity features controlled chiefly by tides and is a vertically mixed estuary having more affinities with embayments than estuaries and aquatic life that is marine rather than estuarine. Boston Harbor received wastes from the 2.5 million people plus industrial wastes from the Boston Metropolitan area. The average sewerage discharge of wastes from this area exceeds 400 cubic feet per second, and the dry weather discharge of tributary streams is near 100 cubic feet per second.
7. In addition to the Charles River, Boston Harbor has seven other tributaries, the Mystic, Malden, Chelsea, Neponset, Weymouth Back, Weymouth

Fore and Weir Rivers. Studies showed that five of these seven rivers were polluted by wastes originating in the Metropolitan Boston area.

8. Combined sewers discharged wastes to the saline reaches of the Mystic, Malden, Chelsea, Charles, Neponset and Weymouth Fore Rivers. A paucity of aquatic life indicative of clean marine waters, excessively abundant polychaete worms, and sludge deposits mixed with oily residues in these reaches were indicative of grossly polluted waters.

9. At least six stream miles of the fresh water segments of the Neponset River in the vicinities of Dedham and Milton, were grossly polluted as shown by a predominance of pollution-tolerant sludgeworms and other waste-water associated aquatic life.

10. The remaining tributaries to Boston Harbor were not perceptibly contaminated by waste water. The most inland waters of the Weymouth Back and Weir Rivers supported a variety of animals suggestive of clean marine waters, such as bivalve molluscs, shrimp and limpets. Oily residues were not found in the bottom deposits of these tributaries.

11. Discharges of municipal and industrial wastes originating in these Boston metropolitan and harbor areas caused degraded water in all of Boston Harbor and associated bays inland from the harbor mouth near Massachusetts Bay, and included Winthrop Bay, Boston Outer Harbor, Boston Inner Harbor, the Fort Point Channel, Dorchester Bay, Quincy Bay, Hingham Bay and Hull Bay. A paucity in the variety of aquatic life in these waters showed much degradation.

12. Deposition of nutrients from these wastes effected overly-abundant pollution-indicating populations of polychaete worms that exceeded 200 per square foot in 34 square miles (80 percent) of Boston Harbor. Populations less than 200 per square foot were associated with the inland sectors of of Quincy Bay and those seaward along a narrow course through Nantasket

Roads to the southern mouth of the harbor at Massachusetts Bay.

13 About 14 square miles (30 percent) of Boston Harbor were grossly polluted as was suggested by polychaete worms that numbered 1,000 or more per square foot. Oily residues, foul odors and suspended sewerage-like particles often were apparent in most reaches of the harbor.

14 Inorganic nutrients, ammonia nitrogen and soluble phosphorus were greater than 100 and 40 micrograms per liter, respectively, in all reaches of the Boston Harbor and adjacent bays inland from its mouth near Massachusetts Bay. These affected excessively dense populations of phytoplankton that averaged more than 1,000 milliliter, (indicative of overly enriched waters) in about 35 square miles (66 percent) of the harbor, including the Weymouth Back and Fore Rivers, and the saline waters of the Charles, Mystic, Malden and Chelsea Rivers.

15 The Fort Point Channel in the Boston Inner Harbor contained sludge with very high percentages of organic carbon (23.5 percent) and organic nitrogen (1.29 percent) similiar to those of raw wastes from packinghouses, sewerage, or rapidly decomposing sludge. The waters of this channel were severely polluted and septic.

16 Percentages of organic carbon and nitrogen in other harbor beds showed extensive bottom deposits and decayed organic materials.

17 Core samples of bottom deposits somewhat distant from immediate waste sources and known channel dredging activities indicated a gradual increase in the percentages of organic matter deposited in recent times

The upstream reach of the Mystic River at the Route 16 bridge near Medford supported only one kind of bottom-associated animal. Substantial quantities of oily residues were observed in the black sludge that covered the river bottom. Additional downstream qualitative sampling disclosed that black sludge predominated in the benthic environment of the Mystic River to its confluence with the Malden River. Phytoplankton density in surface waters of the Mystic River were high, exceeding 40 ppm, or 29,000 cells per milliliter. If not severely polluted these benthic reaches of the Mystic River would support additional kinds of bottom animals such as sludgeworms and midges, or polychaete worms.

The Malden River was severely polluted upstream from its confluence with the Mystic River near the Revere Beach Parkway bridge at Medford. Bottom associated animals were not found here, and four inches of black sludge mixed with oily residues covered the stream bottom. Surface waters of the Malden River contained more than 60,000 phytopplankton per milliliter that amounted to a density of 13.8. The Malden and the Mystic Rivers contributed severely polluted water to the inner reaches of Boston Harbor.

Marine waters supporting polychaete worms prevailed in all but one of the remaining tributaries and in all Boston Harbor reaches. Polychaete worms were sufficiently common in these waters so that there abundance was used to show areas of over-enrichment. The use of sludgeworms and marine worms are used to delineate areas of over-enrichment of fresh and salt water because the nutritional and substrate requirements of both groups of organisms are similiar. Polychaete worms populations that exceed a density of 200 per square foot in the marine waters of Boston Harbor are considered indicative of excessive enrichment.

The two lower reaches of the Chelsea River supported a minimal variety of bottom animals. Samples from the upstream segment near the Broadway bridge contained organisms that represented only two groups of marine animals, polychaete worms and scuds. Suspended solids in wastes discharged to this segment of the river settled to the bottom and provided organic materials that supported 729 polychaete worms per square foot.

The slightly oily, black sludge found here emitted foul odors and surface waters of this reach were streaked with oil from nearby petroleum facilities. Additional downstream wastes caused an increase of to 2,500 per square foot in the polychaete worm population of the Chelsea River near its mouth below the Meridian St. bridge. These were associated with only one other group of organisms, snails. If not grossly polluted, the Chelsea River bottom-animal populations would include such organisms such as clams, crabs, nematode worms, and mussels, and the polychaete worms would be few in numbers.

The confluence of the Chelsea, Mystic and Charles Rivers forms a waterway that is known as Boston Inner Harbor. Tidal currents in the Boston Inner Harbor are strong and rapidly would displace wastes entering the area from these tributaries, but additional wastes entering the harbor exceed the waste dispersal capacity of the currents. Consequently, some wastes from local and tributaries sources are deposited here as sludge. Qualitative sampling taken in the vicinity of the confluence of these tributaries showed that oily sludge covered the bottom reaches of the Inner Harbor, and that the predominant associated aquatic life was polychaete worms. Qualitative samples from the Inner Harbor in the vicinity above the Sumner tunnel showed that the oily sludge deposits here supported 964 polychaete worms per square foot. Other benthic organisms associated with unpolluted marine waters were not found. Such a population of polychaete worms shows excessive enrichment of this reach. It is likely that harbor dredging operations for channel maintenance did sufficiently disturb these bottom deposits to preclude development of higher populations of polychaete worms.

Many other waste outfalls are located in seaward reaches of Boston Inner Harbor. Wastes from those entering the Fort Point Channel severely polluted water there. Qualitative sampling showed an absence of bottom-associated animals and/or organisms in this channel. Sludge deposits in the Fort Point Channel severely polluted and were more than 3 feet deep and contained oily residues and emitted foul odors. Hydrogen sulfide bubbles effervesed from the sludge in this reach, rose to the surface and burst, creating readily apparent odors like those of raw sewerage and rotten eggs.

Settleable solids from additional waste sources in seaward reaches of Boston Inner Harbor were deposited north of Spectacle Island where they formed sludge deposits that supported more than 5,000 polychaete worms per square foot. Severely enriched conditions were apparent. Scuds were the only other organism found here. Such high populations and the presence of only one additional kind of bottom-associated animal attest that this harbor reach was grossly polluted.

Polychaete worms decreased in abundance and the variety of associated animals increased slightly farther seaward in areas near a course toward the mouth of the outer harbor at Massachusetts Bay. These relationships are suggestive of progressive improvements in water quality. Samples from near Deer Island sewer outfalls at the mouth of Boston Harbor supported 115 polychaete worms and four other kinds of benthic organisms per square foot. Bottom materials in these samples consisted of scraps of mollusc shells, small pebbles, black silty particles, sand, and some sewerage - associated wastes such as pieces of vegetables, aluminum foil, and soap like particles. Sewerage-like solids, other assorted rejectiments and oily slicks also were observed in the surface waters of this reach during both flood and ebb tides. Tidal currents here are very strong and likely prevent immediate settling of much suspended matter from the nearby outfalls of the Deer Island sewerage treatment facility. Such observations in the conjunction with the abundance of polychaete worms and the paucity of other kinds of organisms show that this reach was polluted.

Clean water, as indicated by a great variety of benthic organisms was found at the station located seaward of Boston Harbor between Green Island and the Brewster Island. Qualitative sampling from this area showed that it supported at least 14 different groups of organisms. Many of these were clean-water associated animals such as chitons, sponges, starfish, shrimp and crabs. Sludge like deposits were not found here.

Additional wastes sources, primarily combined sewer outfalls, are located in certain other reaches of Boston Harbor. Some of these drained into Winthrop Bay and effected pollution conditions. The most inland reach of Winthrop Bay, north of Logan Airport, supported only two groups of bottom animals, polychaete worms that numbered 404 per square foot and certain shrimp often found on soft sediments. Benthic deposits comprised of dark gray oozy muds emitted a detectable odor of hydrogen sulfide, and contained perceptible oily residues. Samples from the seaward reach of Winthrop Bay between Winthrop and Logan Airport contained sand mixed with black particles, emitted faint odors of hydrogen sulfide, and included six groups of organisms predominated by 716 polychaete worms per square foot of substrate. Tidal currents in the narrow channel are strong and prevent excessive deposition of suspended materials. The lack of a greater variety of bottom animals and the abundance of polychaete worms are suggestive of polluted waters in these reaches.

Near the mouth of Winthrop Bay, polychaete worm populations exceeded a density of 4000 per square foot, seaward and southeasterly from Logan Airport. Other associated organisms were not found. It is reported that wastes from the Deer Island sewerage treatment facility may enter this reach of Winthrop Harbor during flood tide. Settlement of suspended solids from these wastes could form the grayish brown deposits sampled here and would furnish an adequate food supply for this abundant worm population. Strong odors and oily residues were not perceived in such deposits. The seaward reach of Winthrop Bay was polluted.

As in Winthrop Bay, other wastes discharged from the Boston Metropolitan area effected pollution of Dorchester Bay and its fresh water tributary, the Neponset River. In the upstream fresh water reach of the Neponset River at the Neponset Valley Parkway, raw sewerage and combined sewer effluents grossly polluted the water. Pollution tolerant sludgeworms amounting to 10,000 individuals per square foot and short attached streamers of sewerage associated bacteria predominated the substrates here. Sludge contained oily residues and foul odors were noted. No improvement in water quality was observed downstream in the vicinity of the Central Ave. bridge at Milton where oily bottom material supported only 3 kinds of animals not represented by pollution sensitive forms Qualitative samples in this reach showed sludge deposits and rocks stuck together with red precipitates similiar to iron oxide. Such deposits and the associated aquatic life are suggestive that upstream wastes were toxic and of sewerage and industrial origen. Both reaches of the Neponset River were severely polluted, and each contained grossly polluted water which is discharged to Dorchester Bay area of the Boston Harbor.

Apparent pollution and excessive enrichment of Dorchester Bay principally caused by associated combined sewer discharges, was evidenced by lack of organisms other than polychaete worms in samples just north of the Boston Harbor Marina. Samples from these black deposits of sludge contained 1,184 polychaete worms per square foot, emanated strong hydrogen sulfide odors, and contained oily residues. Seaward from this site, near the west side of Thompson Island, two kinds of bottom-animal were found including polychaete worms amounting to 1,756 per square foot. Perceptible quantities of oily residues were noted.

Wastes discharged at Moon Head and those from Nut Island sewerage treatment facility caused excessive enrichment of harbor reaches around Long Island. Benthic deposits supported polychaete worm populations that ranged from 288 to 572 individuals per square foot. Suspended solids were observed in the reach near Moon Head, and the dark gray, soft bottom material here supported four additional kinds of organisms such as snails, scuds and nematode worms. This reach is polluted.

Similiary polluted water was found near the outfalls at the north end of Long Island during flood tides. About two inches of oozy material blanketed the dark sand here.

The primary waste source that caused pollution here is the Nut Island sludge outfall at Long Island. Five kinds of organisms were found here and large numbers of polychaete worms were observed in these polluted reaches that contained black sludge and oily residues.

Excessively enriched waters were not apparent in Quincy Bay and its reaches seaward through Nantasket Roads to the mouth of Boston Harbor between Georges Island and Pemberton. Samples in these reaches however, lacked the great variety or organisms contained in clean water reach associated with Green and Brewster Islands in Boston Harbor.

Samples from the inland reach of Quincy Bay contained only two kinds of bottom animals, and observations of associated surface waters disclosed flocculent sewerage-like particles, waste solids and much oily residue. The paucity of kinds of organisms at these sites is evidence that the waters are polluted.

Disposal of wastes from the Nut Island sewerage treatment plant includes outfalls in the vicinity of Station H 10, in addition to those located north of Long Island.

Moderately polluted waters were indicated between Pemberton and Peddocks Island. Oily residues and flocculent solids resembling sewerage wastes were present in the surface waters.

Excessively dense polychaete worm populations indicatedthat much of the Hingham Bay area, the Weymouth Fore River and Hull Bay were polluted. Oil slicks and suspended flocculent solids were observed in this polluted reach, as in its turbulent reach just seaward of Hingham Bay.

The Weymouth Back River was not significantly polluted, likewise the Weir River was not perceptibly polluted.

Hull Bay was grossly polluted. It supported a minimal of bottom animals predominated by polychaete worms that exceeded 200 per square foot.

NUTRIENTS: Sewerage wastes discharged through the many outfalls in Boston Harbor and associated bays and tributaries caused very high concentrations of ammonia nitrogen and soluble phosphorus that average or exceeded 100 and 40 micrograms per liter. The average concentration of ammonia nitrogen ranged from 100 to 128 micrograms per liter in the southern sectors of Boston Harbor associated with the waters of Nantasket Roads and Hingham and Hull Bays. The average concentrations of soluble phosphorus in these reaches ranged from 40 to 70 micrograms per liter.

High concentrations of inorganic nutrients in these and certain associated waters caused excessively dense populations of phytoplankton that averaged more than 1,000 per milliliter in about 35 square miles or 66% of Boston Harbor, including the Weymouth Back and Fore Rivers, and the saline reaches of the Chelsea, Malden and Mystic Rivers. The highest average phytoplankton densities occured in Boston Inner Harbor, Winthrop Bay, and in the vicinity circumscribed by Georges, Peddocks, Rainsford and Long Island. Hingham, and the inland reaches of Quincy and Dorchester Bays had phytoplankton populations amounting to less than 1,000 per milliliter.

In addition to causing excessive phytoplankton populations, the nutrients stimulated dense growths of attached marine plants. Observations throughout Boston Harbor disclosed such growths on most buoys, piers, and marine facilities. Several intertidal and shallow areas of the harbor and certain reaches of Winthrop Bay also supported dense growths of marine algae. These cause noxious conditions in Winthrop Bayp and decomposing masses of sea lettuce have caused hydrogen sulfide emissions sufficient to discolor white paint on adjacent dwellings.

Wastes discharged from the Boston Metropolitan area contain organic carbon and organic nitrogen that settle and form soft deposits in the receiving waters of Boston Harbor, its associated bays, and the saline reaches of the Chelsea, Malden, Mystic, Neponset and Weymouth Fore River.

The highest percentages of organic carbon (12.5) and organic nitrogen 0.34 in sludge of saline tributaries were found in the most inland reaches of the Chelsea River near the Broadway St. bridge. These values are indicative of actively decomposing organic solids

Sludges from the bayward reaches of the Chelsea River, and from the Malden, Mystic and Neponset Rivers had more than 0.10 percent organic nitrogen and samples had more than four percent carbon. Such values are suggestive of excessively enriched deposits.

The polluted Weymouth Fore River had deposits with less than four percent organic carbon and less than 0.10 percent organic nitrogen. Samples from the Weir River contained aquatic plants that resulted in 4.0 and 0.29 percentages of carbon and nitrogen respectively.

The highest percentages of organic carbon (23.5) and organic nitrogen (1.29) associated with harbor sludges were found in the Fort Point Channel. This reach was very intensively polluted, and septic. Such values are not unlike those associated with raw wastes from packinghouses, sewerage, or rapidly decomposing sludge.

Other harbor reaches had sludges with lesser percentages of organic carbon and nitrogen than Fort Point Channel. More than four percent carbon and 0.20 percent organic nitrogen were found in sludge samples from Boston Inner Harbor, Dorchester Bay near the mouth of the Neponset River and the seaward reach of Winthrop Bay. Samples from the remaining harbor contained less than four but more than two percent organic carbon and organic nitrogen that varied from 0.06 to 0.27 percent. Organic carbon and nitrogen that varied from 0.04 and 0.4 was found in the seaward reaches of Massachusetts Bay. This data show that all of Boston Harbor, its inland bays, and the salt reaches of the Chelsea, Malden, Mystic , Neponset and Weymouth [illegible] River contained extensive deposits of decayed organic material, much of which probably originated from associated waste discharges.

SUMMARY OF BIOLOGICAL SAMPLING OF BOSTON HARBOR

All reaches of Boston Harbor and each of its tributary streams, except the inland reaches of the Weymouth Back and Weir Rivers, were polluted as was evidenced by a paucity of kinds of organisms associated with benthic deposits. About 14 square miles or 30 percent of the inland harbor from Massachusetts Bay were grossly polluted. Depositions of suspended sewerage waste particles effected dense populations of polychaete worms that exceeded 200 per square foot in all of Boston Harbor except those waters associated with the inland sectors of Quincy Bay, and those seaward along a relatively narrow course through Nantasket Roads and to the southern mouth of the harbor at Massachusetts Bay.

Ammonia nitrogen and soluble phosphorus were equal to or greater than 100 and 40 micrograms per liter, respectively, in all areas of Boston Harbor inland from its mouth near Massachusetts Bay. Such high concentrations of nutrients caused overly-enriched conditions that stimulated dense populations of phytoplankton exceeding 1,000 per milliliter in about 35 square miles or 66 percent of the harbor, including the Weymouth Back and Fore Rivers and the saline reaches of the Chelsea, Charles, Malden and Mystic Rivers. Extensive deposits of decayed organic matter and incorporated oily residues covered much of the harbor bed.

STORM SEWERS; During wet-weather , the storm sewer overflows into Boston Harbor and its tributaries do not contribute to the pollution of the waterways. This is due to the fact that when storm sewers overflows from combined system are always discharging raw sewerage, even during dry-weather. The following chart substatiates this theory, for on August 6, 1967, there was a heavy rainfall precipitation of 2.6 inches between the hours of 6.A.M. and 10.00 A.M. The chart will give the average total coliform and fecal coliform count on days preceeding the heavy rainfall and the day after the heavy rainfall, which will demonstrate that storm flows from combined sewers do not raise the coliform bacteria count, in fact the rains lower it considerably. We believe the fecal bacteria coliform count demonstrates this theory more than the total coliform count;

LOCATION	DATE	TOTAL RAINFALL	TOTAL COLIFORM	FECAL COLIFORM
Chelsea River	Aug. 2	0	380,000	10,000
Chelsea River	Aug 4	0	1,500,000	33,000
Chelsea River	Aug 7	0	32,000	690

Note; August 7 is the day following the 2.5 rainfall

Mystic River	Aug. 2	0	1,700,000	3,100
Mystic River	Aug. 4	0	350,000	6,600
Mystic River	Aug 7	0	360,000	2,600

Note: August 7 is the day following the 2.5 rainfall

Neponset River	Aug 2	0	11,000	1,000
Neponset River	Aug 4	0	110,000	200
Neponset River	Aug 7	0	3,300	100

Note; August 7 is the day following the 2.5 rainfall

Lower Neponset	Aug 2	0	28,000	800
Lower Neponset	Aug 4	0	20,000	700
Lower Neponset	Aug 7	0	7,600	100

OPERATING CONDITIONS AND CAPACITY OF EXISTING REGULATORS: STORM SEWERS AND 91 OVERFLOW OUTLETS DISCHARGING CONTINUOUS RAW SEWERAGE IN HARBOR

On the following pages D3 to D59 are listed the operating condition of storm sewers and outlets into Boston Harbor and its tributaries. We believe that if these sewers were modified, repaired, cleaned and tide gates replaced or repaired,that the raw sewerage contamination of Bostoon Harbor and its tributaries could be eliminated completely. We have made a conservative calculation and come up with the figure that these defective sewers, tide gates and interceptors are contributing about 50,000,000 gallons of raw sewerage each day to the pollution of the harbor. Of course to eliminate the pollution completely would require the same procedure by the MDC on its sewerage system, especially in the vicinity of Chelsea, Revere, Cambridge, Watertown, Everett, Malden and in all the upstream reaches of the tributaries of all rivers discharging into Boston Harbor.

A crash program should be initiated to eliminate the highly contaminated discharge from the Roxbury Canal Conduit; Fort Point Channel. Observations were made at low tide at the outlet of this conduit and it is estimated that 3,000,000 gallons are discharged at least once a day. This discharge does not include seawater backflow, it is raw sewerage.

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
East Boston				
III	Belle Isle Inlet	Regulator and tidegate chamber followed by 96-in x 44-in arch and scow-bottom-shaped, brick and wood conduit on MDC North Met. Trunk Sewer.	Inaccessible	--
1	Orient Heights Beach, near Trident Street extended	60-in x 72-in brick conduit extended as 66-in circ. reinf. conc. conduit.	Storm drain surcharged at high tide. No. pollution evident.	--
2	Orient Heights Beach, at Rice Street extended	Abandoned 10-in x 10-in rect. wood drain.	--	--
3	Tidal flats NW of airport, Moore Street extended	Sump-type regulator and tidegate chamber, followed by 60-in circ. reinf. conc. conduit. Single 60-in x 60-in rect. wooden tide gate. Stop-log, sheargate, and float chambers on dry weather connection.	Dry weather connection working satisfactorily. Moderate sludge build-up at sump. Light sludge build-up at tidegate chamber. Tide gate leaks at high tide.	17.3
4	Tidal flats NW of airport, Prescott Street extended	Outlet abandoned. (Sewage going to MDC sewer in Bremen Street and stormwater discharging to outlet No. 5 at Porter Street)	--	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
East Boston				
5	Boston Harbor, Southwest side of airport at Sumner Street extended, from Porter Street at Bremen Street	Sump-type regulator connected by 2-60-in circ. brick conduits in parallel, to tidegate chamber at Bremen Street, followed by 72-in x 76-in brick conduit, extended as 54-in x 90-in horseshoe-shaped, reinf. conc. conduit to Orleans Street, 69-in x 90-in horseshoe-shaped reinf. conc. conduit to Cottage Street and a 144-in x 120-in horseshoe-shaped, reinf. conc. conduit across the airport to Boston Harbor. Two pairs of 60-in double-leaf, wooden tide gates in series. Second tidegate chamber near end of outlet, with two pairs of 84-in x 120-in rect. wooden tide gates in series.	Dry weather connection working satisfactorily. Light sludge build-up in upstream tidegate chamber. One remaining tide gate stuck open. Downstream tidegate chamber inaccessible, but not leaking significantly.	316.0
		Sump-type regulator at Gove Street followed by 48-in x 51-in modified circle brick conduit extending in Orleans Street to tidegate chamber at Porter Street outlet. Two 48-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection blocked and all flow going to outlet. Heavy sludge build-up in sump and medium in tidegate chamber. Tide gates stuck open	
		Sump-type regulator and tidegate chamber at Maverick Street followed by 60-in x 60-in horseshoe-shaped, reinf. conc. conduit extending in Cottage Street to Porter Street outlet. Two 36-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connections blocked and all flow going to outlet. Heavy sludge build-up in tidegate chamber Tidegates stuck open.	

TABLE I CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
East Boston				
6	Boston Harbor at Maverick Street extended	Sump-type regulator at Jeffries Street connected by 51-in circ. reinf. conc. conduit to tidegate chamber followed by 42-in circ. reinf. conc. conduit to second tidegate chamber serving 60-in circ. reinf. conc. airport drain. Two 48-in x 48-in rect. wooden tide gates in series at upstream chamber. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working satisfactorily. Heavy sludge build-up. 48-in tide gates not accessible. All manholes surcharged at high tide.	22.0
7	Boston Harbor at Sumner Street extended	Sump-type regulator at Jefferies Street followed by 24-in x 27-in ovoid-shaped brick conduit. No tidegate chamber found. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working but partially blocked. Moderate sludge build-up. Above tidal influence.	25.7
8	Not operating	--	--	--
9	Boston Harbor at Ruth Street	Sump-type regulator and tidegate chamber at Marginal Street, followed by 24-in x 26-in rect. wooden section. Two 36-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working but partially blocked. Moderate sludge build-up in sump and tidegate chamber. Tide gates stuck partially closed. Slight back-flow at high tide.	9.8

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
East Boston				
10	Boston Harbor at Cottage Street extended	Sump-type regulator and tidegate chamber at Marginal Street, followed by 30-in x 36-in rect. wooden conduit Two 36-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working satisfactorily. Tidegate chamber filled with debris. Upstream gate partially open. Downstream gate stuck closed and tight.	16.9
11	Boston Harbor near Lewis Street extended	24-in storm drain.	Dry	--
12	Boston Harbor at New Street extended	High outlet-type regulator and tidegate chamber at Sumner Street followed by 36-in x 36-in rect. wooden tide gate followed by 36-in metal tide gate. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working satisfactorily. Light sludge build-up. Wooden tide gate stuck open. Metal tide gate not tight. Substantial backflow at high tide.	15.7
13	Boston Harbor near Decatur Street extended	High outlet-type regulator and tidegate chamber at Border Street, followed by 60-in circ. reinf. conc. conduit. 36-in metal tide gate. Stop-log and sheargate chambers on dry weather connection .	Dry weather connection working satisfactorily Little sludge build-up in regulator. Tidegate chamber filled with debris. Metal tide gate not tight. Substantial backflow at high tide.	25.4

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
East Boston				
14	Boston Harbor at Lexington Street extended	Weir-type regulator and tidegate chamber near Border Street followed by 36-in circ. wood conduit. Two 36-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection blocked and almost all flow going to outlet. All manholes surcharged. Upstream tide gates inaccessible. Downstream gate stuck open.	57.0
15	Boston Harbor at Lexington Street extended	15-in x 22-in concrete storm drain.	Not found	--
16	Boston Harbor at Eutaw Street extended	Sump-type regulator and tidegate chamber near Border Street, followed by 36-in x 36-in arch and scow-bottom-shaped, brick conduit extended as 20-in x 24-in rect. wooden conduit. Two 36-in double-leaf wooden tide gates. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection blocked and all flow going to outlet. Heavy sludge build-up. Tide gates stuck open. Sump surcharged at high tide.	99.7
17	Chelsea River at Meridian Street extended	Weir-type regulator at Condor Street, followed by 20-in x 24-in ovoid-shaped, brick conduit, extended as a 24-in circ. vit. clay conduit. No tidegate chamber found. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection blocked and all flow going to outlet. Heavy sludge build-up in regulator. Above tidal influence.	15.6
18	Chelsea River at Putnam Street	Abandoned 30-in x 36-in wooden conduit.	--	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
East Boston				
19	Chelsea River near Eagle Square	Sump-type regulator and tidegate chamber at E. Eagle Street followed by 48-in x 60-in egg-shaped, brick conduit. Two 60-in double-leaf wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection partially blocked and some sewage going to outlet. Heavy sludge build-up in regulator. Tide gates blocked open with trash. Substantial backflow at high tide.	51.1
20	Chelsea River near Chelsea Street Bridge	High outlet-type regulator and tidegate chamber at Curtis Street, followed by 42-in x 44.5-in modified-circle, brick conduit. Two 24-in wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working satisfactorily. No sludge, no tidal effetts. Tide gates not visible.	31.3
217	Clyde Street	12-in circ. vit. clay storm drain.	Dry	--
VI	Chelsea River at Byron Street	Regulator followed by 24-in conduit.	Not found	--
Charlestown				
21	Mystic River at Beacham Street	Abandoned 12-in x 12-in wood drain.	--	--
22	Mystic River at Malden Bridge	Abandoned 12-in conduit.	--	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Charlestown				
23	Mystic River at Beach Street extended	Sump-type regulator at Medford Street connected by 63-in x 66-in modified-circle, brick conduit to tidegate chamber followed by 63-in circ. brick conduit extended as 63-in circ. reinf. conc. conduit. One 60-in metal tide gate.	Dry weather connection working satisfactorily. Moderate sludge and debris in tidegate chamber. Tide gate leaks. Substantial backflow at high tide.	33.4
24	Little Mystic Channel at Elm Street extended	Abandoned 30-in x 36-in wooden conduit.	--	--
25	Little Mystic Channel near Starr-king Court extended	Weir-type regulator chamber at Medford Street followed by 24-in x 36-in rect. wood conduit. No tide gate.	Weir chamber working satisfactorily. No sludge.	20.2
26	Little Mystic Channel at Chelsea Street extended	Weir-type regulator and tidegate chamber in Chelsea Street at Medford Street followed by 30-in x 39-in egg-shaped, brick conduit extended as 30-in x 40-in horseshoe-shaped, brick conduit and 36-in x 40-in egg-shaped brick conduit in Chelsea Street. Two 36-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working satisfactorily. No sludge in regulator manhole. Tidegate chamber filled with debris. Tide gates missing. Substantial backflow and regulator surcharged at high tide.	11.4

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Charlestown				
27	Boston Harbor near Vine Street extended	Sump-type regulator at Vine Street connected by 48-in x 51-in modified-circle, brick conduit flowing in reverse to second high outlet-type regulator and tidegate chamber in Chelsea Street, followed by 46-in x 64-in brick conduit extended as 64-in x 92-in oval-shaped, brick conduit and 60-in circ. reinf. conc. conduit across Boston Naval Shipyard. Two 48-in double-leaf, wooden tide gates in series.	Dry weather connection working satisfactorily. Light sludge build-up. Upstream tide gate missing, downstream gate stuck open. Large timber in chamber. Substantial backflow at high tide.	66.2
28	Boston Harbor at Wapping Street extended (U.S.S. Constitution)	Sump-type regulator and tidegate chamber at Water Street followed by 48-in circ. brick conduit. Extended as 36-in x 36-in rect. conc. conduit. Two 48-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection plugged and all flow going to outlet. Heavy sludge build-up. Upstream tide gate stuck open. One leaf at downstream tide gate stuck open and other leaf lying in invert. Substantial backflow and regulator surcharged at high tide.	19.1
29	Boston Harbor at Grey Street (Hoosac Pier No. 1)	Sump-type regulator and tidegate chamber near Water Street followed by 48-in circ. brick conduit extended as 48-in circ. cast iron conduit. Two 48-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers in dry weather connection.	Dry weather connection plugged and all flow going to outlet. Tide gate stuck open. Regulator surcharged at high tide.	67.6

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Charlestown				
30	Boston Harbor at Warren Avenue Bridge	Sump-type regulator and tidegate chamber near Water Street followed by 30-in x 36-in brick conduit. One 36-in double-leaf, wooden tide gate followed by 36-in metal gate in series. Dry weather connection to outlet No. 32.	Dry weather connection working satisfactorily. Little or no sludge. Upstream tide gate stuck open. Downstream tide gate not tight. Substantial backflow at high tide.	14.1
32	Boston Harbor at Charles River Avenue extended (NE of Charlestown Bridge)	Sump-type regulator and tidegate chamber near Water Street, followed by 30-in x 36-in egg-shaped, brick conduit. Two 48-in double-leaf, wooden tide gates in series. Dry weather connection has stop-log and sheargate chambers and also serves outlet No. 30 through common sump.	Dry weather connection working satisfactorily. Light sludge in regulator. Heavy sludge at tidegate chamber outlet. Tide gates stuck partially open. Substantial backflow at high tide.	18.9
33	Millers River, across railroad yard from Front Street	Sump-type regulator and tidegate chamber followed by 30-in x 36-in egg-shaped, brick conduit extended as 18-in x 24-in rect. wood conduit. Two 36-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working satisfactorily. Light sludge. Tide gates stuck open. Substantial backflow at high tide.	9.8

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Charlestown				
34	Millers River across railroad yard from Front Street	Sump-type regulator and tidegate chamber followed by 24-in x 24-in rect. wooden conduit. One 24-in single-leaf, wooden tide gate followed by 24-in metal tide gate in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection working satisfactorily. Light sludge build-up. Tide gates fairly tight but some backflow.	20.6
35	Millers River across Dunstable Street extended	Sump-type regulator and two tidegate chambers in parallel at Rutherford Avenue followed by 72-in x 84-in U-shaped, conc. conduit, extended as 48-in x 60-in oval-shaped, wooden conduit and 72-in x 72-in rect. wooden conduit, and triple 48-in circ. reinf. conc. railroad culvert to Millers River. Two pairs of 48-in double-leaf, wooden tide gates in series. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection partially blocked and most flow discharging to outlet. Upstream gates inaccessible. One downstream gate stuck open. Regulator surcharged at high tide.	207.0
215	Millers River across railroad yard, Crescent Street extended	Sump-type regulator connected by 12-in circ. conduit to tidegate chamber, followed by 36-in circ. reinf. conc. conduit and railroad culvert to Millers River. 15-in metal tide gate.	Dry weather connection working satisfactorily. Heavy sludge in tidegate chamber.	19.5
216	Mystic River east of Malden Bridge (J.J. Ryan Jr. Playground)	15-in circ. reinf. conc. storm drain.	Dry	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Charlestown				
257	Mystic River west of Malden Bridge (south bank)	20-in circ. brick storm drain .	Not inspected	--
Brighton				
36	Charles River at Faneuil Station	9-in x 20-in wooden storm drain.	Not found	--
37	Charles River at Parson Street extended	High outlet-type regulator and tidegate chamber followed by 60-in x 60-in rect. wooden conduit. Two 48-in double-leaf, wooden gates in series.	Dry weather working satisfactorily. Light sludge in sump but heavy build-up in tidegate outlet. Large timbers in tide gate outlet. Frequent overflows to river.	46.1
XII	Charles River near North Beacon Street extended at Birmingham Parkway (Faneuil Valley Brook)	Weir-type regulator and tidegate chamber in Washington Street followed by 54-in circ. brick conduit in Fairbanks Street and easement, and in easement and Faneuil Street as 78-in x 90-in horseshoe-shaped brick conduit, and 84-in circ. conc. conduit, 132-in x 108-in horseshoe-shaped	Dry weather flow retained in sewer. No sludge but sand on weir. Visible tide gate appears in good condition.	123.4

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Brighton				
XII (continued)		brick conduit, 99-in circ. conc. conduit, 144-in circ. brick conduit, and 152-in x 132-in horseshoe-shaped, brick conduit. Two 48-in double-leaf wooden tide gates.		
		Regulator and tidegate chamber in Faneuil Street, north of Newcastle Road and Harriet Street, discharging to outlet. Two 36-in double-leaf, wooden tide gates.	Regulator not accessible but dry weather flow retained in sewer. Visible tide gate badly deteriorated.	
		Regulator and tidegate chamber in Parsons Street, north of Faneuil Street, and Harriet Street, discharging to outlet. Two 36-in double-leaf, wooden tide gates.	Regulator not accessible, but heavy dry weather flow retained in sewer. Visible tide gate appears in good condition.	
		Regulator in North Beacon Street, at Vineland Street, followed by 30-in x 39-in ovoid-shaped, brick conduit, extended to outlet in 36-in circ. reinf. conc. conduit.	Dry weather connection working but some flow going to outlet.	
39	Charles River at Arsenal Street Bridge	Sump-type regulator followed by 30-in x 39-in brick conduit. Inverted siphon crossing structures and tidegate chamber on conduit. Two 36-in double-leaf, wooden tide gates in series.	Manholes surcharged. Tide gates not visible.	17.7

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Brighton				
40	Charles River south of Cambridge Street Bridge	Regulator (high point in sewer), extended as 36-in circ. reinf. conc. conduit. Tidegate chamber with single 36-in metal tide on 36-in conduit. Sump connection to MDC sewer at Seattle Street and Cambridge Street.	Some sewage discharging to outlet.	11.6
41	Charles River north of Babcock Street extended (Salt Creek)	Weir-type regulator and tidegate chamber near Ashford Street, followed by 90-in x 84-in horseshoe-shaped, conduit. Two 36-in double-leaf, wooden tide gates in series. Tributary sewers converted to separate sanitary system.	Dry weather connection working satisfactorily. No sludge. No signs of overflows. Upstream gates not visible. Downstream gates not working. Conditions at high river levels not known. Operating as storm drain.	--
XI	Charles River north of St. Mary's Street extended	Two sump-type regulators and two tidegate chambers at Commonwealth Avenue, followed by 90-in circ. reinf. conc. conduit. West tidegate chamber with two pairs of rect. wooden gates in series. East chamber with two rect. wooden gates in series.	Dry weather connections not visible. Substantial backflow in west chamber and regulator surcharged. East chamber not found.	78.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Brighton				
202	Charles River near North Beacon Street extended	30-in circ. reinf. conc. storm drain.	Not found	--
205	Charles River near Soldiers Field Road, at Lothrop Street	36-in circ. vit. clay storm drain.	Not found	--
207	Charles River at Telford Street extended (Shepard Brook)	66-in circ. conc. storm drain.	Quantity of rusty-colored water discharging to river.	--
208	Charles River near North Harvard Street extended (Larz Anderson Bridge)	36-in circ. brick storm drain.	Dry	--
211	Charles River at Armory Street extended	60-in circ. cast iron storm drain.	Sewage discharging to river.	--
214	Charles River at Raleigh Street extended	24-in circ. vit. clay storm drain.	Surface water	--
258	Charles River north of Western Avenue Bridge (west bank)	24-in circ. vit. clay storm drain.	Dry	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Roxbury				
43	Charles River at Deerfield Street extended (Muddy River Conduit)	Sump-type regulator and tidegate chamber at Commonwealth Avenue, followed by 108-in x 132-in oval-shaped, wood and concrete conduit. Two 60-in x 60-in rect. wooden tide gates in series. Second tidegate chamber near end of outlet with two 60-in x 108-in rect. wooden tide gates in parallel.	Dry weather connection working satisfactorily. No sludge visible. Tide gates tight.	15.0
246	Muddy River near Huntington Avenue (east bank)	45-in x 45-in U-shaped conc. storm drain.	Dry	--
247	Muddy River opposite Aspinwall Avenue extended	18-in circ. vit. clay storm drain.	Dry	--
248	Muddy River at Francis Street extended (east bank)	Storm drain.	Not found	--
250	Muddy River at Blackfan Street extended	30-in x 30-in horseshoe-shaped, concrete storm drain.	Small amount of clear water standing in outlet.	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
44	Charles River at Charlesgate West extended		Not found	--
45	Charles River at Charlesgate East extended	Weir-type regulator and tidegate chamber at Elmwood Street near Linden Park Street, followed by Old Stony Brook Conduit as 96-in x 72-in horseshoe-shaped reinf.conc. conduit to Hampshire Street, dual 99-in x 114-in rect. reinf. conc. conduit in Whittier Street, multiple culverts at Ruggles Street, dual 99-in x 126-in rect. reinf. conc. conduit in Forsyth Street to Boston Gate House No. 2 (Outlet No. S-2) and 84-in circ. brick and 84-in circ. concrete foul Channel to MDC Fens Gate House at Boston Marginal Conduit near end of outlet. Two rec. wooden tide gates in series at upstream tidegate chamber. Three sluice gates in parallel at Boston Gate House No. 2. One sluice gate and tide gate on outlet to Charles River Basin and one sluice gate to Marginal Conduit at MDC Fens Gate House.	Dry weather flow connection working satisfactorily. Moderate sludge. Tide Gate, visible at upstream chamber, appears in good condition.	2,270.0
		Sump-type regulator and tidegate chamber at Cabot and Vernon Streets followed by 40-in x 49-in ovoid-shaped brick conduit in Vernon Street to Old Stony Brook Conduit. Two 48-in double-leaf wooden tide gates in series.	Dry weather connection blocked and all flow discharging to outlet. Moderate sludge. Visible tide gate stuck open in sludge.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45 (continued)		High outlet-type regulator at west corner of Shawmut Avenue and Vernon Street. 78-in circ. brick conduit in Shawmut Avenue, 90-in x 132-in horseshoe-shaped, brick conduit in Ruggles Street and Hampshire Street to Old Stony Brook Conduit. (Maywoods Brook Conduit)	Dry weather flow retained in sewer. No sludge.	
		Sump-type regulator and tidegate chamber at east corner of Shawmut Avenue and Vernon Street, discharging to Maywoods Brook Conduit. One double-leaf, wooden gate.	Dry weather connection partially blocked and some flow discharging to outlet. Moderate sludge. Tide gate appears in good condition.	
		Regulator and tidegate chamber at southeast corner of Ruggles Street and Shawmut Avenue discharging to Maywoods Brook Conduit. One tide gate.	Dry weather connection partially blocked and some flow discharging to outlet. Moderate sludge.	
		Sump-type regulator and tidegate chamber at north corner of Ruggles Street and Shawmut Avenue, discharging to Maybrook Conduit.	Dry weather connection working satisfactorily. Moderate sludge.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45 (continued)		High outlet-type regulator and tidegate chamber at Tremont Street and Whittier Street, discharging to Old Stony Brook Conduit. One double-leaf, wooden tide gate.	Dry weather connection blocked and all flow discharging to outlet. Heavy sludge. Tide gate stuck open in sludge.	
		Sump-type regulator and tidegate chamber in Ruggles Street at Forsyth Street, discharging to Old Stony Brook Conduit. Single 24-in metal tide gate visible.	Dry weather connection working satisfactorily, but manhole at downstream siphon chamber with 12-in connection to Old Stony Brook Conduit surcharged and 12-in tide gate not visible. Moderate sludge. 24-in tide gate appears satisfactory.	
		Sump-type regulator and tidegate chamber in Huntington Avenue discharging to east barrel of Old Stony Brook Conduit in Forsyth Street. Double-leaf, wooden tide gate. Stop-log and sheargate chambers on dry weather connection.	Dry weather connection surcharged and sewage discharging to outlet. Moderate sludge. Tide gate appears in good condition.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45 (continued)		Sump-type regulator and tidegate chamber at Parker Avenue, followed by inverted siphon under Commissioners Channels and extending northeasterly in Huntington Avenue as 36-in x 48-in egg-shaped brick conduit to west barrel of Old Stony Brook Conduit at Forsyth Street. Two 48-in double-leaf, wooden tide gates. Second tide-gate chamber at Forsyth Street outlet, with double-leaf, wooden tidegate. One low-level outlet, with sluice gate normally closed and one high-level outlet at siphon inlet (west) chamber, discharging to west barrel of Commissioners Channels at Parker Street. Additional sump-type regulator and dry weather connection in siphon outlet (east) chamber at Parker Street.	Both dry weather connections surcharged and appear to be blocked and heavy flow discharging to Old Stony Brook Conduit. Low-level outlet below water surface and position of sluice gate not known. High-level outlet not spilling. Moderate sludge.	
		Two 10-in connections from sanitary sewer to drain at Robert Street, east of Fairview Street.		
		High outlet type regulator and tidegate chamber in Woodman Street discharging from tributary of the Stony Brook Valley Sewer to Goldsmith Brook conduit	Dry weather flow retained in Woodman Street sewer. No sludge. Gate missing.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45 (continued)		in St. Joseph Street as 72-in x 72-in horseshoe-shaped brick conduit, and in South Street, easement, McBride Street and Rossmore Road as 102-in x 72-in horseshoe-shaped brick conduit, 72-in x 60-in horseshoe-shaped stone conduit, 102-in x 81-in horseshoe-shaped brick conduit, and 72-in x 72-in horseshoe-shaped stone conduit. This conduit discharges to Stony Brook Conduit which extends northerly in Meehan Street and Brookside Avenue as a 240-in x 192-in horseshoe-shaped reinf. conc. conduit to Green Street; northerly in easement and Columbus Avenue, parallel to the railroad, to Parker Street at Gurney Street and in Parker Street to Longwood Avenue in 204-in x 186-in horseshoe-shaped brick conduit (relieved part way by 114-in x 108-in horseshoe-shaped brick conduit in Amory Street, from Green Street to near Porter Street); northerly in Parker Street in twin 150-in x 144-in horseshoe-shaped brick conduits from Longwood Avenue to Huntington Avenue, diagonally across Forsyth Way, and in easement in 316-in x 162-in horseshoe-shaped brick conduit		

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45 (continued)		from Huntington Avenue to Boston Gate House No. 1 (Outlet No. S-1) west of Gate House No. 2; followed by 144-in x 144-in horseshoe-shaped, reinf. conc. foul flow channel to the MDC Fens Gate House at the Boston Marginal Conduit near end of outlet. Four automatic sluice gates in parallel at Boston Gate House No. 1. Two sets of three tide gates each in series at MDC Fens Gate House.		
		High outlet-type regulator and tidegate chamber at McBride Street, discharging from tributary of Stony Brook Valley Sewer to Goldsmith Brook Conduit in South Street. Double-leaf, wooden tide gate.	Dry weather flow retained in sewer. No sludge. Gate appears in good condition.	
		High outlet-type regulator and tidegate chamber at Washington Street, discharging from tributary of Stony Brook Valley Sewer to Goldsmith Brook Conduit in Rossmore Street. One 36-in double-leaf, wooden tide gate.	Small part of dry weather flow discharging to outlet. Heavy sludge in regulator. Gate appears to be deteriorated and stuck open.	
		High outlet-type regulator in Green Street, discharging from tributary of Stony Brook Valley Sewer to Stony Brook Conduit at Brookside Avenue.	Dry weather flow retained in sewer. No sludge.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45 (continued)		High outlet-type regulator in Green Street. Discharging from Stony Brook Valley Sewer to Stony Brook Conduit at Amory Street.	Dry weather flow retained in sewer. No sludge.	
		High outlet-type regulator in south side of Boylston Street, discharging from tributary of Stony Brook Valley Sewer to Stony Brook Conduit west of Amory Street.	Dry weather flow retained in sewer. Moderate sludge and signs of overflows.	
		High outlet-type regulator in north side of Boylston Street, discharging from tributary of Stony Brook Valley Sewer to Stony Brook Conduit west of Amory Street.	Inaccessible	
		High outlet-type regulator in easement, discharging from tributary of Stony Brook Valley Sewer to Stony Brook Conduit, 400 ft north of Boylston Street.	Inaccessible	
		High outlet-type regulator discharging from West Roxbury Low-level Sewer to Stony Brook Conduit at Hoffman Street.	Inaccessible	
		High outlet-type regulator discharging from tributary of Stony Brook Valley Sewer to Stony Brook Conduit at Hoffman Street.	Inaccessible	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45 (continued)		High outlet-type regulator in Amory Street at Centre Street (southeast connection) discharging from Stony Brook Valley Sewer to Stony Brook Conduit.	Dry weather flow retained in sewer. No sludge.	
		High outlet-type regulator in Amory Street at Centre Street (northeast connection, discharging from Stony Brook Valley Sewer to West Roxbury Low-Level Sewer.	Dry weather flow retained in sewer. No sludge.	
		High outlet-type regulator in Centre Street at Amory Street (west connection) discharging from tributary of Stony Brook Valley Sewer to Stony Brook Conduit.	Dry weather flow retained in sewer. No sludge.	
		High outlet-type regulator in Amory Street, 250 ft south of Ritchie Street, discharging from tributary of Stony Brook Valley Sewer to 48-in x 48-in horseshoe-shaped, brick conduit in easement as 72-in circ. reinf. conc. conduit to Stony Brook Conduit.	Dry weather flow retained in sewer. No sludge. Outlet not visible.	
		High outlet-type regulator in Columbus Avenue at Ritchie Street, discharging to tributary of Stony Brook Conduit. Described in previous paragraph.	Dry weather flow retained in sewer. No sludge. Outlet not visible.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45	(continued)	High outlet-type regulator in Centre Street at Columbus Avenue, discharging from tributary of Stony Brook Valley Sewer to Stony Brook Conduit.	Dry weather connection blocked and all flow discharging to outlet. Moderate sludge.	
		High outlet-type regulator in Columbus Avenue at Heath Street, discharging from Stony Brook Valley Sewer to 84-in x 120-in rect. brick west barrel of Old Stony Brook Conduit, and 60-in circ. brick conduit to Stony Brook Conduit.	Dry weather flow retained in sewer, but small freeboard.	
		High outlet-type regulator in Columbus Avenue at New Heath Street, discharging from Stony Brook Valley Sewer to 84-in x 120-in rect. brick west barrel of Old Stony Brook Conduit connected by 60-in circ. brick conduit to Stony Brook Conduit.	Inaccessible	
		High outlet-type regulator in New Heath Street at Columbus Avenue discharging from tributary of Stony Brook Valley Sewer to 84-in x 120-in rect. brick west barrel of Old Stony Brook Conduit connected by 60-in circ. brick conduit to Stony Brook Conduit.	Dry weather connection plugged and all flow discharging to outlet. Heavy sludge.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
45 (continued)		High outlet-type regulator in Cedar Street at Columbus Avenue, discharging from tributary of Stony Brook Valley Sewer to West Roxbury Low-Level Sewer.	Inaccessible	
		High outlet-type regulator in Columbus Avenue (east side) at Tremont Street (Roxbury Crossing), discharging from tributary to Stony Brook Interceptor to tributary of Old Stony Brook Conduit.	Dry weather flow retained in sewer. Moderate sludge.	
		Weir-type regulator in Tremont Street west of Columbus Avenue (Roxbury Crossing), discharging from tributary of Stony Brook Interceptor to Stony Brook Conduit.	Dry weather flow retained in sewer. No sludge.	
		Sump-type regulator in Columbus Avenue (west side) at Tremont Street (Roxbury Crossing), discharging from tributary of Stony Brook Interceptor to tributary of Old Stony Brook Conduit.	Dry weather connection plugged and all flow discharging to outlet.	
46 through 50	Charles River from Harvard Bridge to near Charles River Dam	Weir-type regulators, tidegate chambers and outlet conduits from MDC Boston Marginal Conduit to Charles River Basin.	Inaccessible	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
51	Not Operating	--	--	--
X-1	Charles River at Hereford Street extended, to Boston Marginal Conduit	Sump-type regulator and tidegate chamber at Beacon Street, followed by 51-in x 51-in rect. wooden conduit, extended as 51-in x 51-in rect. conc. conduit. Two 36-in metal tide gates in series. Sheargate chamber on each dry weather connection (2).	Dry weather connection blocked and all flow going to outlet. No sludge build-up visible. Tide gates working.	113.9
X-2	Charles River at Fairfield Street extended, to Boston Marginal Conduit	Sump-type regulator and tidegate chamber at Beacon Street, followed by 36-in x 48-in rect. wooden conduit, extended as 43-in x 43-in rect. wooden conduit. Two 36-in metal tide gates in series. Sheargate chamber on dry weather connection.	Dry weather connection blocked and all flow going to outlet. Moderate sludge build-up. Tide gates working.	76.3
X-3	Charles River at Dartmouth Street extended, to Boston Marginal Conduit	Sump-type regulator and tidegate chamber at Beacon Street, followed by 36-in x 48-in egg-shaped, brick conduit. Two 36-in metal tide gates in series. Sheargate chamber on dry weather connection.	Dry weather connection blocked and going to outlet. Moderate sludge build-up. Tide gates working . Regulator surcharged.	57.5

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
X-4	Charles River at Berkeley Street extended, to Boston Marginal Conduit	Sump-type regulator and tidegate chamber at Beacon Street, followed by 48-in x 60-in eggeshaped, brick section. Two 36-in metal tide gates in series. Sheargate chamber on dry weather connection.	Dry weather connection blocked and all flow discharging to outlet. Moderate sludge build-up. Tide gates working.	100.4
X-5	Charles River, Beaver Place at Brimmer Street	Abandoned	--	--
X-6	Charles River, Beaver Street to Boston Marginal Conduit, via Beacon Street, Beaver Street and Beaver Place (outlet for Church Street Sewer)	Sump-type regulator opposite Brimmer Street, connected by 41-in x 53-in ovoid-shaped, brick conduit in Beacon Street to tidegate chamber at Beaver Street, followed by 48-in x 60-in rect. wooden conduit in Beaver Street, and 84-in x 96-in U-shaped, concrete conduit in Beaver Place. Two 36-in metal tide gates in series. Second tidegate chamber near end of outlet.	Dry weather connection working satisfactorily. Moderate sludge in tidegate chamber at Beacon Street. Some backflow through upstream tide gates at high tide. Tidegate chamber in Beaver Place not found.	69.4
X-7	Charles River at Mt. Vernon Street to Boston Marginal Conduit	Weir-type regulator at River Street, followed by 36-in x 36-in U-shaped conc. conduit. Tidegate chamber with two 24-in metal tide gates in series near end of outlet.	Dry weather connection not visible, but appears to be working satisfactorily. Moderate sludge build-up. Upstream tide gate missing.	19.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Back Bay				
251	Back Bay Fens at Worthington Street extended (south bank)	24-in circ. vit. clay storm drain.	Drain surcharged with clear water. Outlet blocked.	--
252	Back Bay Fens at Kilmarnock Street extended (north bank)	15-in circ. vit. clay storm drain.	Clear water running in drain. Outlet not found.	--
Boston Northwest				
X-8	Charles River at Pinckey Street, to Boston Marginal Conduit	Weir-type regulator and tidegate chamber, followed by 42-in x 20-in U-shaped brick and wood conduit, extended as 24-in x 24-in rect. conc. conduit. Two 18-in metal tide gates in series.	Dry weather flow retained in sewer. Moderate sludge build-up. Upstream tide gate open. Downstream tide gate closed.	7.7
X-9	Charles River at Cambridge Street, to Boston Marginal Conduit	Sump-type regulator and tidegate chamber, followed by 60-in x 42-in brick conduit. Two 36-in metal tide gates in series.	Sump not visible. Dry weather connection apparently working satisfactorily. Upstream tide gate closed. Downstream tide gate off hinges and lying in bottom of chamber. Moderate sludge.	28.8
X-10	Charles River at Fruit Street, to Boston Marginal Conduit	Sump-type regulator and tidegate chamber at Charles Street, followed by 36-in x 30-in rect. wooden conduit. 24-in metal tide gate upstream. 24-in wooden tide gate downstream.	Dry weather connection working satisfactorily. Light sludge build-up. Tide gates open.	11.9

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Northwest				
X-11	Charles River in Charles Street, to Boston Marginal Conduit (formerly at Poplar Street, but not listed in House 1600)	Weir-type regulator and tidegate chamber north of Allen Street, followed by 30-in x 36-in conduit. Two 45-in x 45-in rect. wooden tide gates in series.	Dry weather flow retained in sewer. Light sludge build-up. Tide gates leak. Substantial backflow at high tide.	14.9
X-12	Charles River in Charles Street, to Boston Marginal Conduit (formerly at Chambers Street)	Weir-type regulator and tidegate chamber. Two 24-in metal tide gates in series.	Dry weather flow retained in interceptor, except for small discharge to outlets. Tide gates appear satisfactory.	10.1
52	Charles River, south of dam lock (MDC)	Regulator at Boston Marginal Conduit extended.	Not inspected.	--
X-13	Charles River at Charles River Dam, to Boston Marginal Conduit (formerly Leverett Street)	24-in x 54-in U-shaped conc. storm drain.	Not inspected.	--
53	Charles River, north of Charles River Dam (MDC)	Boston Marginal Conduit Outlet.	Not inspected.	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Northwest				
54	Charles River, northwest of Nashua Street extended	Weir-type regulator at Causeway Street, followed by 72-in x 90-in rect. reinf. conc. conduit. Tidegate chamber near end of outlet with two 84-in x 81-in rect. wooden gates in series.	Dry weather flow retained in interceptor. No sludge build-up. Upstream tide gate closed. Downstream gate missing.	87.5
		Weir-type and high outlet-type regulators at Nashua Street connected directly to tidegate chamber.	Regulators working. No sludge build-up.	
		Weir-type regulator and tidegate chamber at Causeway Street, followed by 36-in x 60-in conc. conduit extending parallel to Causeway Street to Outlet No. 54 at Nashua Street. Two 36-in metal tide gates in series. (This was formerly Outlet No. 55 before being diverted to Outlet No. 54).	Peak dry weather flows spill to outlet. Light sludge build-up. Tide gates in good condition.	
55	Charles River at Canal Street extended	Abandoned. Diverted to Outlet No. 54. (See description above).	--	--
56	Charles River near Beverly Street and Warren Bridge	Weir-type regulator and tidegate chamber at Causeway Street, followed by 36-in circ. reinf. conc. conduit extended as 36-in circ. cast iron conduit. One 36-in metal tide gate.	Dry weather flow retained in interceptor. Tide gate in good condition.	14.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING

(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Northwest				
57	Charles River at Prince Street extended	Outlet abandoned.	Dry	--
58	Charles River at Prince Street extended	Sump-type regulator and tidegate chamber at Commercial Street, followed by 36-in x 36-in rect. wood conduit extended as 30-in x 12-in rect. wood conduit. Two 24-in metal tide gates.	Signs of frequent overflows. Heavy sludge build-up. Slight backflow at high tide.	49.1
59	Boston Harbor at Charter Street extended	Sump-type regulator and tidegate chamber at Commercial Street, followed by 16-in x 24-in rect. wood conduit. Two 24-in tide gates.	Dry weather connection blocked and flow going to outlets. Heavy sludge build-up. Both tide gates missing.	15.4
Boston Downtown				
60	Boston Harbor at Hanover Street extended	Sump-type regulator and tidegate chamber at Commercial Street, followed by 18-in x 24-in egg-shaped, brick conduit, extended as 18-in x 20-in egg-shaped,brick conduit. 36-in x 48-in rect. wooden conduit and 36-in circ. cast iron conduit. Two 24-in tide gates.	Dry weather connection working satisfactorily. Heavy sludge build-up indicates frequent overflows. One 24-in metal tide gate held open by sludge. One gate missing. Surcharged at high tide.	25.9

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Downtown				
61	Boston Harbor near Battery Street	Sump-type regulator and tidegate chamber near Commercial Street, followed by 24-in x 36-in egg-shaped, brick section, extended as 24-in x 36-in rect. wood conduit, and 24-in x 24-in rect. wood conduit. Two 24-in tide gates.	Dry weather connection working satisfactorily. Heavy sludge build-up indicates frequent overflows. One 24-in metal tide gate working satisfactorily. One gate missing.	54.0
61A	Boston Harbor at Battery Street extended	Two storm drains	Dry	—
62	Boston Harbor near Clark Street extended	Sump-type regulator and tidegate chamber near Commercial Street, followed by 36-in x 36-in rect. wooden conduit. Two tide gates in series.	Dry weather connection not working and flow going to outlet. Moderate sludge build-up. Tide gates missing. Heavy timbers caught in tidegate chambers.	4.4
63	Boston Harbor at Eastern Avenue extended	Storm drain	Dry	—
64	Boston Harbor at Clinton Street extended	Sump-type regulator, followed by 72-in x 60-in reinf. conc. conduit. Tidegate chamber on east side of Atlantic Avenue with two 60-in rect. wooden tide gates in series.	Substantial discharge of dry weather flow to Harbor at low tide. No backflow at high tide.	250.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Downtown				
65	Boston Harbor near State Street extended	Storm drain.	Dry	--
66	Boston Harbor near Central Street extended	Sump-type regulator, followed by 72-in x 72-in rect. reinf. conc. conduit. Tidegate chamber on east side of Atlantic Avenue with two 72-in x 72-in wooden tide gates in series. Stop-log chamber on dry weather connection.	Dry weather flow discharging directly to harbor at low tide. Gate chamber not accessible (buried under construction materials). Regulator surcharged at high tide.	41.4
67	Boston Harbor at Belcher Lane extended	Sump-type regulator and tidegate chamber, followed by 24-in x 24-in rect. wood conduit. Two 24-in tide gates.	Dry weather connection working satisfactorily. ManHole cover in sump. Heavy sludge build-up in tidegate chamber. One 24-in metal tide gate. One gate missing.	11.4
218	Fort Point Channel, Oliver Street extended	Sump-type regulator, extended as 54-in x 72-in rect. reinf. conc. conduit. Tidegate chamber with two 72-in x 54-in rect. wooden gates in series.	Sump surcharged. No sludge build-up seen. Tidegates appear satisfactory. Substantial discharge to outlet.	66.0
68	Fort Point Channel at Congress Street	Regulator (high point in outlet) and tidegate chamber near Gilbert Place, followed by 36-in x 36-in rect. wooden conduit. 36-in double-leaf, wooden tide gate upstream. 36-in metal tide gate downstream.	Dry weather flow discharging through outlet at low tide. Outlet surcharged at high tide.	10.3

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Downtown				
69	Fort Point Channel at Summer Street	Regulator (high point in outlet) and tidegate chamber near Dorchester Avenue, followed by 60-in brick conduit. Two 60-in double-leaf wooden tide gates.	Some dry weather flow discharging through outlet at low tide. Outlet surcharged at high tide.	36.0
70	Fort Point Channel at Kneeland Street extended	Sump-type regulator and tidegate chamber at Atlantic Avenue, followed by 81-in x 81-in horseshoe-shaped, brick conduit. Two pairs of tide gates in series near upstream end.	Dry weather connection working satisfactorily. No sludge. Some backflow through upstream pair of 36-in metal tide gates at high tide. Downstream pair of tide gate openings are planked up.	77.0
259	Fort Point Channel north of Congress Street Bridge (west bank)	24-in circ. vit. clay storm drain.	Not inspected.	--
Boston Southwest and South				
71	Fort Point Channel at Castle Street extended	8-in cast iron stormwater pumping station force main.	Not inspected.	--
72	Fort Point Channel near Troy Street extended	Sump-type regulator in Albany Street, extended as 72-in circ. reinf. conc. section. Two original 60-in rect. wooden tide gates in series.	Sump surcharged. Some backflow at high tide.	62.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Southwest and South				
73	Fort Point Channel at Dover Street extended	Regulator at Harrison Avenue, followed by 40-in x 49-in ovoid-shaped, brick conduit, extended as 48-in circ. reinf. conc. conduit. Tidegate chamber with two 48-in double-leaf wooden tide gates at upstream end of 48-in conduit.	Outlet blocked. Overflow line surcharged. Tide gates not visible.	32.0
74 through 83	Outlets tributary to Roxbury Canal Conduit and Dorchester Brook Conduit	For description of these outlets, see Outlet No. 219.	--	--
219	Fort Point Channel, Roxbury Canal Conduit outlet (Dorchester Brook Conduit tributary)	Roxbury Canal Conduit extends northeasterly as 204-in x 120-in rect. reinf. conc. conduit; 216-in x 120-in rect. reinf. conc. conduit, double 180-in x 120-in rect. reinf. conc. conduit; double 204-in x 120-in rect. reinf. conc. conduit; double 204-in x 150-in rect. reinf. conc. conduit; double 240-in x 186-in rect. reinf. conc. conduit, discharging to Fort Point Channel. Sump-type regulator and tidegate chamber, followed by 72-in x 78-in horseshoe-shaped, brick conduit in Massachusetts Avenue, from northwest (Outlet No. 79) Two 60-in rect. wooden tide gates.	Regulator surcharged but dry weather connection working satisfactorily. Moderate sludge in tidegate chamber. Upstream gate working. Downstream gate missing.	2,240.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Southwest and South				
219 (continued)		Sump-type regulator and tidegate chamber in Massachusetts Avenue from southeast (Outlet No. 80), followed by 48-in circ. brick conduit. Two 48-in x 48-in rect. wooden tide gates in series.	Regulator and tidegate chamber surcharged at low tide.	
		Not found (Outlet No. 78).	--	
		Regulator, followed by 81-in x 93-in horseshoe-shaped reinf. conc. conduit in E. Concord Street (Outlet No. 77). Tidegate chamber with two 81-in x 87-in rect. wooden tide gates in series at Albany Street.	Dry weather connection working satisfactorily. Moderate sludge. Upstream gate has fallen off and is laying in invert. Downstream gate works but leaks at high tide.	
		Sump-type regulator and tidegate chamber at E. Dedham Street, extended (Outlet No. 76), followed by 60-in x 72-in arch and scow bottom shaped brick conduit, extended as 60-in x 72-in rect. conc. conduit. 78-in x 92-in rect. wooden tide gate followed by 60-in metal tide gate.	Regulator manhole surcharged but dry weather connection appears to be working satisfactorily. Light sludge. Downstream tide gate timbered shut.	
		Union Park Street Pumping Station at Union Park Street extended (Outlet No. 75 , "low level") connected by 69-in x 63-in conc. force main to tidegate chamber at Albany Street, followed by 33-in x 126-in conc.	Station under repair. Tidegate chamber surcharged.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Southwest and South				
219 (continued)		conduit extended in 91-in x 126-in rect. reinf. conc. conduit (shared with Outlet No. 74). One 69-in x 54-in rect. wooden tide gate.		
		Sump-type regulator and tidegate chamber at Union Park Street extended (Outlet No. 74 , "high level") at Albany Street, followed by 58-in x 126-in rect. reinf. conc. conduit, followed by 91-in x 126-in rect. reinf. conc. conduit. Two 88-in rect. wooden tide gates.	Regulator and tidegate chamber surcharged.	
		Sump-type regulator and tidegate chambers on Dorchester Brook Sewer at Massachusetts Avenue (Outlet No. 81), followed by Dorchester Brook Conduit as 142-in x 104-in, 142-in x 124-in and 144-in x 120-in horseshoe-shaped reinf. conc. conduit discharging to open channel at railroad crossing to double 204-in x 150-in rect. reinf. conc. conduit and double 204-in x 162-in rect. reinf. conc. conduit to Roxbury Canal Conduit. Two sets in series of four parallel 48-in x 72-in rect. wooden tide gates.	Dry weather connection partially blocked or too small, and constant flow being discharged to outlet. Some sludge. Tide gates missing or not working.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Boston Southwest and South				
219 (continued)		Sump-type regulators and tidegate chambers in Damrell Street, and D Street near Dorchester Avenue, (Outlet No. 82), followed by 90-in x 101-in horseshoe-shaped, reinf. conc. conduit to Dorchester Brook Conduit, except for short section of open channel at railroad crossing. Additional tidegate chamber on this outlet at upstream end of open channel. Damrell Street chamber has one 36-in rect. wooden tide gate; D Street chamber one 48-in rect. wooden tide gate; downstream outlet chambers have two 51.5-in x 101-in rect. wooden tide gates in parallel.	Dry weather connection working satisfactorily. Light sludge at regulators. Tidegate chamber in Damrell Street always surcharged at high tide. Tide gates in remaining chamber stuck open. Slight backflow at high tide.	
		Sump-type regulator in B Street and tidegate chamber west of Dorchester Avenue, (Outlet No. 83), followed by 72-in circ. brick conduit extended as 78-in x 94-in rect. conc. conduit, 72-in circ. brick conduit and 92-in x 78-in rect. conc. conduit to Dorchester Brook Conduit. Two 72-in x 72-in rect. wooden tide gates in series. Second tidegate chamber near end of outlet, with one 78-in x 92-in rect. wooden tide gate.	Dry weather connection working satisfactorily. Sludge condition not known. Tide gates in upstream chamber badly deteriorated and not working. Gate in downstream chamber missing.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
South Boston				
84	Fort Point Channel at West Fourth Street Bridge	Sump-type regulator and tidegate chamber at Foundry Street, followed by 24-in x 24-in rect. wooden section. Two 24-in circ. wooden tide gates in series.	Sump not visible but no dry weather flow discharging through tidegate chamber. Condition of gates not determined, but appear tight.	8.0
85	Fort Point Channel At Dorchester Avenue Bridge	High outlet-type regulator near Foundry Street, followed by 60-in circ. brick section. Tidegate chamber near end of outlet. Two 60-in double-leaf, wooden tide gates in series.	Dry weather connection working satisfactorily. No sludge build-up. Both gates not working. Substantial backflow at high tide.	28.0
86	Fort Point Channel at Mt. Washington Avenue	High outlet-type regulator and tidegate chamber, followed by 72-in circ. brick conduit. Two 36-in double-leaf, wooden tide gates in series. Tributary sewers converted to separate sanitary system.	Dry weather connection working satisfactorily. No sludge build-up. Downstream tide gates blocked open by heavy debris in chamber. Regulator surcharged and substantial backflow at high tide.	1.2
86A	Fort Point Channel at Summer Street Bridge (southeast end)	Storm drain outlet.	Dry	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
South Boston				
87	Fort Point Channel at Congress Street Bridge (southeast end)	Storm drain outlet.	Slight discharge - no odor.	--
220	Reserved Channel at F Street extended	High outlet-type regulator in West First Street, followed by 40-in x 60-in rect. wood conduit extended in D Street, extended as easement as 60-in circ. reinf. conc. and 60-in circ. iron conduits, 72-in circ. reinf. conc. conduit and 84-in circ. reinf. conc. conduit. Two 48-in double-leaf, wooden tide gates in series, in chamber near West First Street. Second tidegate chamber near outlet.	Dry weather flow retained in interceptor. Moderate sludge build-up in upstream tidegate chamber. Upstream tide gate in upstream chamber not accessible. Downstream gate not tight. Regulator surcharged at high tide. Downstream tidegate chamber not found. (Area under development).	39.1
		High outlet-type regulator and tidegate chamber in D Street, West of Cypher Street, connected to outlet. Two 48-in x 60-in rect. wooden tide gates in series.	Dry weather connection working satisfactorily. Moderate sludge build-up. Gates not tight. Regulator surcharged and some backflow at high tide.	
		Sump-type regulator and tidegate chamber in F Street extended as 48-in circ. reinf. conc. conduit. Two double-leaf, wooden tide gates in series.	Dry weather connection working satisfactorily. No sludge build-up seen. Tide gates missing.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
South Boston				
220 (continued)		Sump-type regulator in East First Street connected to regulator above.	Dry weather connection working satisfactorily.	
89	Reserved Channel at Claflin Street extended	24-in vit. clay surface drain at E Street.	Dry	--
90	Reserved Channel at I Street extended	High outlet-type regulator and tidegate chamber at East First Street, followed by 36-in x 42-in arch and scow bottom shaped, brick and wood conduit. Two 48-in double-leaf, wooden tide gates in series.	Dry weather connection on I Street working satisfactorily. Moderate sludge in all structures. Gates stuck open. Regulator surcharged at high tide.	24.7
		High outlet-type regulator to southeast of intersection and connected to above tidegate chamber.	Dry weather connection blocked and flow discharging to outlet. Regulator surcharged at high tide.	
91	Reserved Channel at Summer Street (from East First Street)	Sump-type regulator and tidegate chamber at East First Street, followed by 24-in x 30-in egg-shaped, brick conduit, extended as 30-in circ. reinf. conc. conduit, and 60-in circ. brick conduit. Two 24-in metal tide gates. Second tidegate chamber near outlet with 30-in metal tide gate. Pumping Station on Edison Electric Company property discharges to 30-in pipe.	Dry weather connection working satisfactorily. Moderate sludge and some debris in sump. Sludge in gate chamber. Gates working but regulator surcharged at high tide.	3.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
South Boston				
99	Old Harbor, Mt. Vernon Street extended	Weir-type regulator at Morrissey Blvd., followed by 60-in circ. conc. conduit extended as an 84-in x 84-in rect. reinf. conc. conduit, 62-in x 116-in rect. wooden conduit and another 84-in x 84-in circ. reinf. conc. conduit, 120-in x 120-in rect. reinf. conc. conduit, and double 84-in x 96-in rect. reinf. conc. conduit. Tide gate structure located at downstream end of 120-in x 120-in conduit with two pairs of 90-in x 96-in rect. wooden tide gates in series.	Weir clean. All dry weather flow to interceptor at low tide. Substantial backflow through tide gates stuck open and in very poor condition.	550.0
		Weir-type regulator on Crescent Avenue, followed by 45-in circ. conc. conduit in Carson Street, extended as 51-in circ. brick conduit, 78-in circ. brick conduit and 96-in x 96-in rect. reinf. conc. conduit to outlet described above.	Dry weather flow retained interceptor. Regulator clean.	
		Weir-type regulator at Crescent Avenue, followed by 48-in circ. brick conduit in Sidney Street to conduit at Carson Street. Tidegate chamber with two 48-in double-leaf wooden tide gates in series near end of conduit.	Dry weather flow spilling to outlet. Tide gates stuck open. Moderate sludge in chamber.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Dorchester				
100	Dorchester Bay, Freeport Way extended (Dorchester Yacht Club)	Weir-type regulator at overflow structure east of railroad diverts excess flow from Outlet No. 101 and discharges it through two 78-in circ. reinf. conc. conduits in parallel, extended as two 84-in circ. cast-iron conduits in parallel. Overflow structure has long side-weir, outlet channel, and tidegate chamber with two 96-in x 72-in rect. wooden tide gates in parallel. Second tidegate chamber with two 78-in metal tide gates in parallel at upstream end of 84-in conduits.	Condition of upstream tidegate chamber indicates frequent overflows. Both sets of tide gates working satisfactorily.	(See Outlet No. 101)
101	Dorchester Bay, South of Savin Hill to Fox Point (Freeport Street Brook)	High outlet-type regulator and tidegate chamber at Bowdoin Street, followed by 54-in circ. brick conduit, extended as 72-in circ. brick conduit in easement, parallel to Hancock Street, to east of Dorchester Avenue, in easement as 96-in x 162-in horseshoe-shaped, brick conduit, 144-in x 132-in horseshoe-shaped, reinf. conc. conduit, 168-in x 130-in U-shaped conc. conduit to overflow structure at Outlet No. 100. Downstream in 96-in x 120-in rect. reinf. conc. conduit to tidegate chamber at Fox Point, east of Morrissey Boulevard; followed by two 90-in x 82-in rect. reinf. conc. conduits in parallel.	Dry weather connection working satisfactorily. Only one gate remains at Fox Point chamber.	372.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Dorchester				
107	Neponset River on Hallet Street (Davenport Brook)	High outlet-type regulator and tidegate chamber at Fuller Street near Clermont Street, followed by 54-in circ. brick, 48-in circ. reinf. conc. 84-in x 90-in rect. reinf. conc., 88-in x 90-in rect. reinf. conc. 66-in x 132-in rect. reinf. conc. and two 74-in x 93-in rect. reinf. conc. conduits. One 18-in wooden tide gate.	Dry weather flow retained in interceptor. No sludge. Tide gate stuck open. Above tidal influence.	300.0
		Weir-type regulator and tidegate chamber at Adams Street, near Minot Street, connected directly to outlet conduit, described above. One 24-in metal tide gate.	Some dry weather flow spilling to outlet. Some sludge in tidegate chamber. Tide gate tight.	
		Weir-type regulator and tidegate chamber on interceptor in Hallet Street, near end of outlet. Two 48-in double-leaf, wooden tide gates.	Water in regulator stationary. Tide gates not visible.	
108	Neponset River, Hilltop and Lenoxdale Street	36-in concrete storm drain outlet.	Dry	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
South Boston				
92	Reserved Channel at Farragut Road extended	Sump-type regulator and tidegate chamber in East First Street, followed by 60-in brick conduit to Farragut Road and extended in Farragut Road as 72-in x 72-in U-shaped conc. conduit. Additional tidegate chamber at upper end of 72-in x 72-in conduit. One 24-in metal tide gate at East First Street chamber and two 78-in x 72-in rect. wooden tide gates at Farragut Road.	Dry weather connection completely blocked and all flow discharging to outlet. Tide gates working.	37.8
		Sump-type regulator in East Second Street, followed by 30-in x 36-in U-shaped, conc. conduit in Farragut Road to outlet at East First Street.	Dry weather connection in Farragut Road and Marine Park to East Sixth Street, partially blocked and substantial flow discharging to outlet.	
93	Old Harbor, Farragut Road extended	Sump-type regulator and tidegate chamber at Sixth Street, followed by 30-in circ. cast-iron conduit. Single 18-in diameter metal tide gate.	Dry weather connection working satisfactorily. Light sludge in sump. Small leak through tide gate.	7.3
94	Old Harbor, N Street extended	Sump-type regulator and tidegate chamber at Day Boulevard, followed by 36-in x 48-in egg shaped, brick conduit, extended as 48-in circ. cast-iron conduit. Two double-leaf wooden tide gates in series.	Grit and regulator sumps, and dry weather connection plugged. Tide gates missing except for one leaf. All sewage discharging through outlet.	33.7

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
South Boston				
95	Old Harbor, K Street extended	Sump-type regulator at Marine Road, followed by 24-in x 27-in ovoid-shaped, brick conduit, extended as 36-in circ. brick and 36-in circ. iron conduit. No tidegate chamber	Dry weather connection working satisfactorily. Heavy sludge in sump.	4.8
96	Old Harbor, H Street extended	Sump-type regulator and tidegate chamber at Marine Road, followed by 60-in circ. brick conduit, extended as 60-in circ. cast-iron conduit. 60-in double-leaf, wooden tide gate upstream and 60-in metal tide gate downstream in series.	Dry weather connection working satisfactorily. Sump clear. One timber gate leaf stuck closed. Leak in metal tide gate.	150.8
		Weir-type regulator at East Eighth Street, followed by 18-in circ. vit. clay conduit in I Street extended as 24-in x 36-in U-shaped conc. conduit.	Sanitary flow from I Street, entering from connections below regulator at East Eighth Street. I Street regulator retaining dry weather flow.	
97	Old Harbor, Rev. R.A. Burke Street extended (formerly Vale Street)	Sump-type regulator and tidegate chamber at Marine Road, followed by 78-in circ. brick conduit, extended as 78-in x 78-in rect. reinf. conc. conduit, and double 60-in circ. cast-iron conduits, in parallel. Two 48-in double-leaf wooden tide gates in series. Flushing gate chamber at end of 78-in x 78-in conduit with two 48-in x 60-in gates.	Sump clear. Dry weather connection working satisfactorily. One leaf of upstream gate stuck open. Some backflow through tide gates, as clear water Sluice gates in flushing chamber.closed.	108.0

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
South Boston				
98	Old Harbor, Kemp Street extended	Sump-type regulator and tidegate chamber at Henry Sterling Square, followed by 124-in x 75-in horseshoe-shaped brick and 124-in x 75-in horseshoe-shaped reinf. conc. conduit, extended as triple 60-in circ. cast-iron conduit. Two pairs of double 60-in x 60-in rect. wooden tide gates in series. Flushing gate chamber at end of 124-in x 75-in conduit with three 60-in x 48-in gates.	Flow discharging to interceptor at low tide and to outlet on falling tide. Substantial back flow through tidegate chamber on rising tide. Gates inoperative or missing.	60.0
		South regulator sump and tidegate chamber at Old Colony Avenue, followed by connection to 124-in x 72-in outlet conduit. Two 36-in double-leaf, wooden tide gates in series.	Heavy sludge in sump. Connection to interceptor plugged. All dry weather flow going to outlet. Both gates stuck partially open.	
		North regulator sump and tidegate chamber at Old Colony Avenue, followed by connection to 124-in x 72-in outlet conduit. Two 60-in double-leaf, wooden tide gates in series.	Sump and dry weather connection working satisfactorily at low tide. Surcharged at high tide. Both gates stuck partially open.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Dorchester				
101 (continued)		One 18-in circ. wooden tidegate at Bowdoin Street and two pairs of 90-in x 82-in rect. wooden tide gates in series at Fox Point chamber.		
		High outlet-type regulator and one 18-in circ. wooden tide gate in Hancock Street, at High Street, discharging to outlet.	Dry weather connection working satisfactorily.	
		Sump-type regulator and tidegate chamber at Dorchester Avenue north of Hoyt Street to outlet conduit. Two 60-in double-leaf, wooden tide gates in series. 24-in circ. vit. clay dry weather connection, with tide gate.	Dry weather connection working satisfactorily at low tide. Moderate sludge in sump and chamber. Tide gates stuck open, or missing. Heavy backflow on rising tide and raw sewage discharging to outlet on falling tide.	
		Sump-type regulator in Hancock Street, followed by 48-in x 48-in rect. conc. conduit extending northerly in Dorchester Avenue to regulator described above. Tidegate chamber on conduit with two 60-in rect. wooden tide gates in series.	Dry weather connection partially blocked and substantial sewage flow discharging to outlet at low tide. Moderate sludge build-up in regulator and chamber. Tide gates working satisfactorily. Interceptor surcharging at high tide.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Dorchester				
101 (continued)		High outlet-type regulator at Savin Hill Avenue, followed by 64-in x 68-in then 64-in x 72-in rect. reinf. conc. conduits in series in Auckland Street to outlet. Tidegate chamber at outlet with two 72-in wooden tide gates in series.	Not observed.	
		High outlet-type regulator on Dorchester Interceptor at Auckland Street connected to outlet at two places; 12-in circ. vit. clay conduit to West and tidegate chamber with two 60-in double-leaf, wooden tide gates to East.	Flow retained in sewer at low tide. Light sludge. Surcharged at high tide.	
		Sump-type regulator and tidegate chamber on Freeport Street, near Kimball Street, followed by 84-in circ. brick conduit to outlet. Two pairs of 48-in double-leaf, wooden tide gates in series.	Dry weather connection working satisfactorily at low tide. No sludge build-up in sump or chamber. Tide gates stuck open. Heavy backflow on rising tide and raw sewage discharging on falling tide.	
		Sump-type regulator and tidegate chamber on Freeport Street, at Kimball Street, extended to 84-in conduit above. Two 48-in double-leaf, wooden tide gates in series.	Dry weather connection working satisfactorily at low tide. Tide gates stuck open. Substantial backflow and regulator manhole surcharged at high tide.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Dorchester				
102	Not operating (combined with Outlet No. 101)	--	--	--
103	Neponset River, Tenean Bay near Victory Road (Tenean Creek)	High outlet-type regulator on Geneva Avenue at Waldeck Street, followed by 63-in x 63-in horseshoe-shaped, brick conduit, extended as 96-in x 78-in horseshoe-shaped, brick conduit, 96-in x 72-in horseshoe-shaped brick conduit, 168-in x 144-in horseshoe-shaped, brick conduit and 168-in x 138-in horseshoe-shaped conc. conduit and 144-in x 144-in horseshoe-shaped reinf. conc. conduit to Southeast Expressway; followed by 144-in x 180-in rect. reinf. conc. conduit to end of outlet.	Dry weather flow retained in interceptor. No sludge.	500.0
		Weir-type regulator at Park Street, followed by 42-in circ. brick conduit in Marlowe Street, and easement to outlet conduit.	Dry weather flow retained in sewer. Light sludge indicates recent overflows.	
		Weir-type regulator and tidegate chamber at Park Street east of Geneva Avenue. One double-leaf, wooden tide gate.	Dry weather flow spilling to interceptor. Moderate sludge. Sewer may be partially blocked by deposits downstream. Tide gate stuck open.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Dorchester				
103 (continued)		High outlet-type regulator at Gibson Street, near Bispham Street, followed by 18-in circ. vit. clay conduit in easement to outlet conduit.	Not found.	
		Weir-type regulator and tidegate chamber on Adams Street at Christopher Street. 36-in double-leaf, wooden tide gate.	Dry weather flow retained in sewer. Light sludge. Tide gates missing.	
		Regulator and siphon chamber on side of interceptor in Sturtevant Street, to divert flows to Tenean Creek conduit at Christopher Street.	Siphon inlet structure surcharged. Heavy scum. Regulator not found.	
		High outlet-type regulator on Park Street, near Clayton Street, followed by 48-in x 48-in rect. wooden conduit extending to outlet conduit.	Regulator surcharged. Overflow outlet not visible.	
		Sump-type regulator at Houghton Street, followed by 48-in circ. brick conduit in Victory Road to outlet conduit. Tidegate chamber near outlet conduit with 36-in metal gate.	Dry weather connection working but some flow discharging to outlet. Moderate sludge build-up in sump and chamber. Tide gate closed but interceptor surcharged at high tide.	
		Weir-type regulator at Gibson Street, followed by 30-in x 42-in egg-shaped, brick conduit in Dorchester Avenue to outlet conduit.	Dry weather flow retained in sewer. Some sludge indicated recent overflow.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
104	Neponset River at Ericson Street extended	Regulator and tidegate chamber followed by 15-in circ. vit. clay conduit. Metal tide gate.	Interceptor plugged up downstream and flow discharging to outlet. Heavy sludge build-up in sump and chamber. Sump surcharged at high tide.	3.0
105	Neponset River at Tenean Street west of Lawley Street (Fine Neck Creek)	Storm drain outlet with 72-in metal tide gate extended as 72-in circ. reinf. conc. conduit.	Dry. Tide gate in good condition.	--
106	Neponset River at Neponset Bridge	Sump-type regulator and tidegate chamber at Craddock Street, followed by 36-in x 48-in egg-shaped, brick conduit in Neponset Avenue, extended as 36-in x 42-in arch and scow bottom, brick and wood conduit, and tidegate chamber, followed by 48-in circ. reinf. conc. outlet conduit. 48-in double-leaf, wooden tide gate followed by 36-in metal tide gate.	Dry weather connection plugged and sewage discharging to outlet. Moderate sludge build-up in sump and chamber. Wooden gate stuck partially open. Metal gate working satisfactorily.	30.0
		Weir-type regulator and tidegate chamber at Walnut Street, followed by 30-in x 36-in arch and scow bottom, brick and wood conduit extending in Taylor Street to upstream end of 36-in x 42-in conduit mentioned above. 36-in double-leaf, wooden tide gate followed by 30-in metal tide gate.	Weir not effective and sewage discharging to outlet. Light sludge build-up at regulator and chamber. One leaf of wooden tide gate in invert. Metal tide gate appears satisfactory.	

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Dorchester				
109	Neponset River at Granite Avenue extended	Weir-type regulator connected by inverted siphon to tidegate chamber, followed by 36-in x 48-in egg-shaped, brick conduit. 48-in double-leaf, wooden tide gate, followed by 36-in metal tide gate.	Some dry weather flow discharging to outlet at low tide. Substantial flow discharging at high tide. Moderate sludge build-up in regulator and chamber. Part of wooden tide gate missing.	39.6
221	Dorchester Bay, cove at Savin Hill Avenue (North)	24-in circ. vit. clay storm drain.	Dry	--
222	Dorchester Bay, Malibu Beach cove at Denny Street extended	30-in circ. cast iron storm drain.	Sewage discharging to outlet.	--
223	Dorchester Bay, Malibu Beach cove at Dorchester Yacht Club	36-in circ. reinf. conc. storm drain.	Not inspected.	--
224	Neponset River at Mellish Road extended	High outlet-type regulator, followed by a 34-in x 24-in rect. reinf. conc. outlet conduit.	Dry	--
225	Neponset River at Bearse Avenue extended	15-in circ. vit. clay storm drain.	Dry	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS (continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Dorchester				
226	Neponset River at Adams Street and Dorchester Avenue	30-in x 24-in rect. stone.	Dry	--
227	Neponset River, east of Central Avenue Bridge	30-in circ. vit. clay storm drain.	Small discharge of clear water to outlet.	--
228	Neponset River at Blue Hill Avenue	72-in circ. brick storm drain.	Small discharge of clear water outlet.	--
229	Neponset River south of River Street at Edgewater Drive	102-in x 72-in horseshoe-shaped, brick storm drain.	Small discharge of water at outlet.	--
230	Neponset River near Osceola Street	21-in circ. vit. clay storm drain.	Dry	--
231	Neponset River at Belnel Road extended	24-in circ. cast iron storm drain with metal tide gate on end.	Dry	--
232	Neponset River west of Wood Avenue extended	69-in circ. conc. storm drain.	Small discharge of clear water at outlet.	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
Hyde Park				
233	Neponset River near Rosa Street extended	48-in circ. conc. storm drain.	Small discharge of clear water at outlet.	--
234	Neponset River at West Street extended (north bank)	30-in circ. conc. storm drain.	Dry.	--
235	Neponset River at Erie Street extended (south bank)	24-in circ. vit. clay storm drain.	Small amounts of clear water discharging to outlet.	--
236	Neponset River at Walter Street extended (north bank)	30-in circ. corrugated-metal storm drain.	Dry.	--
237	Neponset River at Milton Avenue extended (south bank)	Sanitary sewer regulator with sluice gate.	Dry. Gate closed.	--
238	Neponset River at Warren Avenue extended (south bank)	24-in circ. vit. clay storm drain.	Small amounts of sewage discharging to outlet.	--
239	Neponset River near Fairmount Avenue Bridge (north bank)	24-in circ. vit. clay storm drain.	Dry.	--

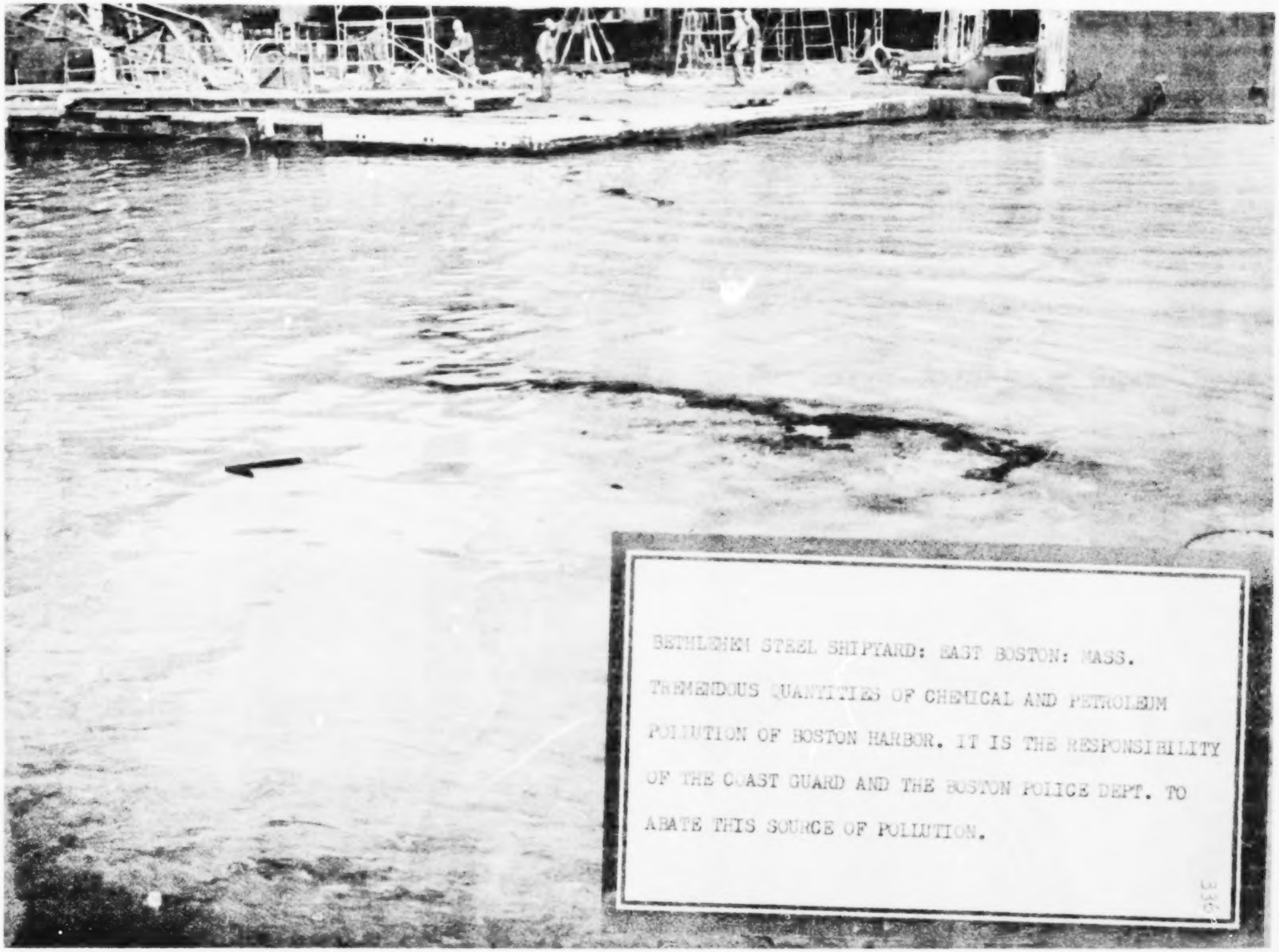
TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
240	Neponset River at Fairmount Avenue bridge (south bank)	24-in circ. vit. clay storm drain.	Dry.	--
241	Neponset River at Williams Avenue extended (south bank)	33-in circ. conc. storm drain.	Small amounts of clear water discharging to outlet.	--
242	Neponset River at Mason Street extended (north bank)	18-in circ. vit. clay storm drain.	Dry.	--
243	Neponset River at Reservation Road extended (north bank)	24-in circ. vit. clay storm drain.	Dry.	--
244	Neponset River at Cranmore Road extended (west bank)	54-in circ. reinf. conc. storm drain.	Not inspected.	--
West Roxbury				
245	Charles River near Stimson Street extended	126-in x 126-in rect. reinf. conc. storm drain discharging to paved channel.	Dry except for groundwater pumped from adjacent construction site.	--
245A	Charles River north of Spring Street	30-in circ. vit. clay storm drain.	Not inspected.	--

TABLE 1 CONDITION AND CAPACITY OF EXISTING OUTLETS
(continued)

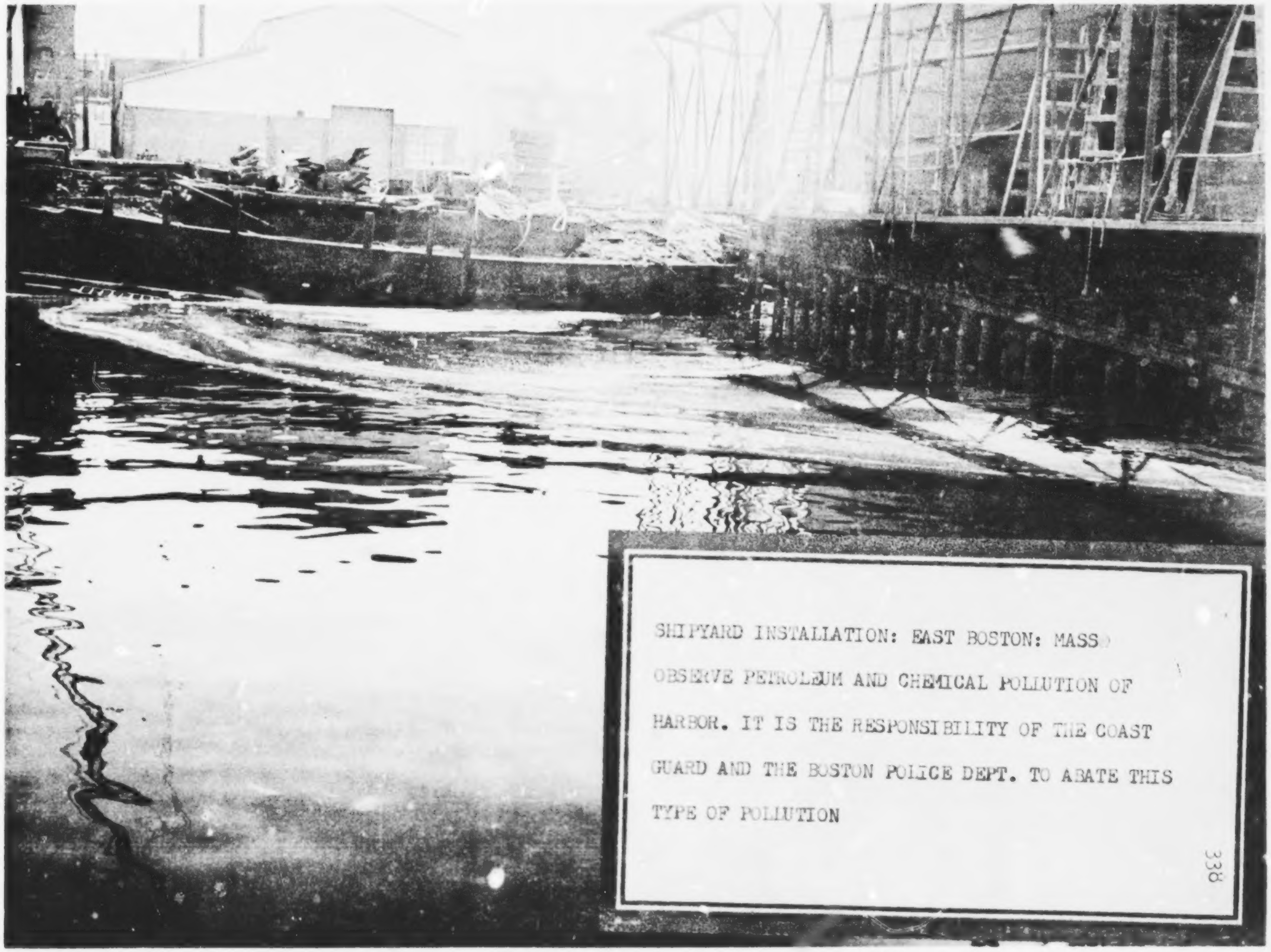
Outlet No.	Location	Description of Outlet	Observed Condition	Estimated Capacity (mgd)
West Roxbury				
255	Charles River via Brook Farm Brook and Baker Street Brook at Capital Street extended (St. Joseph's cemetery)	36-in circ. reinf. conc. storm drain.	Dry.	--
256	Charles River via Brook Farm Brook near Newfield Street extended west of LaGrange Street (St. Joseph's cemetery)	120-in x 80-in rect. reinf. conc. storm drain.	Dry.	--

[illegible] NO. 2; BOSTON NAVY YARD: CHARLESTOWN, MASS. CARRIERS, CRUISERS, DESTROYERS, ETC, ALL DISCHARGE RAW SEWERAGE INTO BOSTON HARBOR: ESTIMATED RAW SEWERAGE 2,000,000 GALLONS DAILY. THIS FIGURE DOES NOT INCLUDE RAW SEWERAGE DISCHARGE FROM NAVY YARD

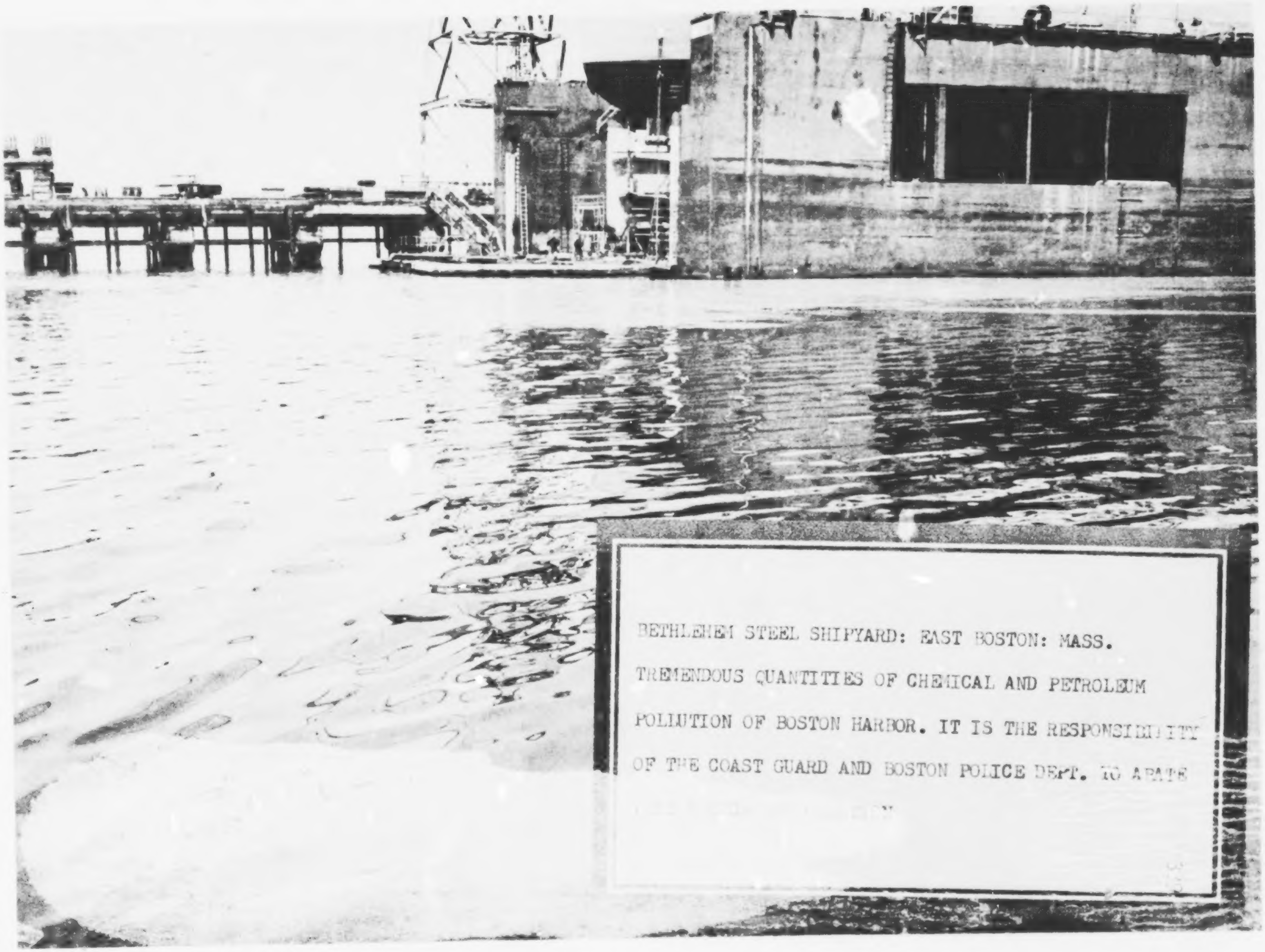


BETHLEHEM STEEL SHIPYARD: EAST BOSTON: MASS.
TREMENDOUS QUANTITIES OF CHEMICAL AND PETROLEUM
POLLUTION OF BOSTON HARBOR. IT IS THE RESPONSIBILITY
OF THE COAST GUARD AND THE BOSTON POLICE DEPT. TO
ABATE THIS SOURCE OF POLLUTION.

PHOTO NO. 1: BOSTON NAVY YARD: CHARLESTOWN, MASS. CARRIERS, CRUISERS, DESTROYERS, ETC. ALL DISCHARGE RAW SEWERAGE INTO BOSTON HARBOR; ESTIMATED RAW SEWERAGE 2,000,000 gallons DAILY. THIS FIGURE DOES NOT INCLUDE RAW SEWERAGE DISCHARGE FROM NAVY YARD



SHIPYARD INSTALLATION: EAST BOSTON: MASS OBSERVE PETROLEUM AND CHEMICAL POLLUTION OF HARBOR. IT IS THE RESPONSIBILITY OF THE COAST GUARD AND THE BOSTON POLICE DEPT. TO ABATE THIS TYPE OF POLLUTION



BETHLEHEM STEEL SHIPYARD: EAST BOSTON: MASS.

TREMENDOUS QUANTITIES OF CHEMICAL AND PETROLEUM

POLLUTION OF BOSTON HARBOR. IT IS THE RESPONSIBILITY

OF THE COAST GUARD AND BOSTON POLICE DEPT. TO ABATE

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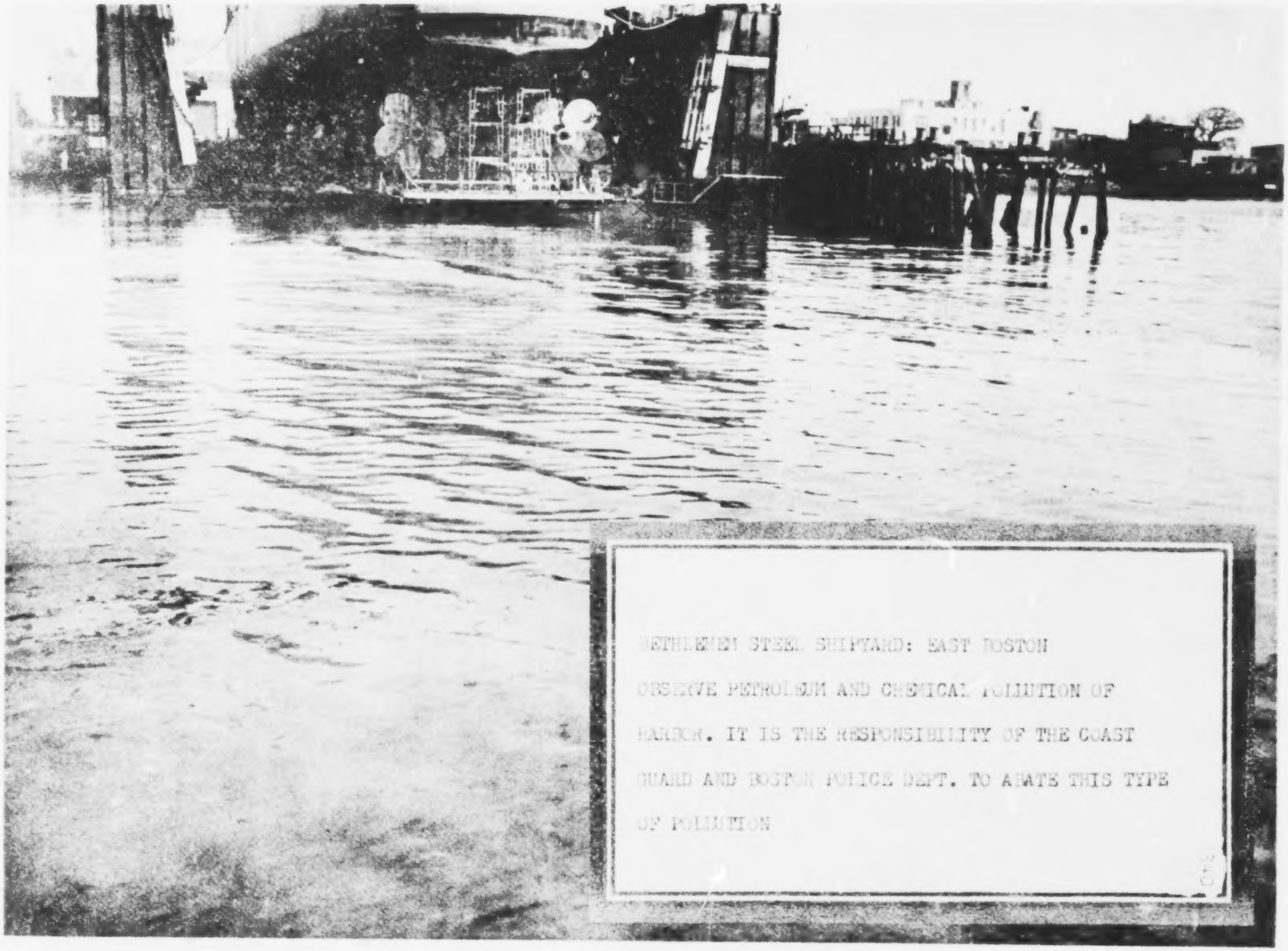
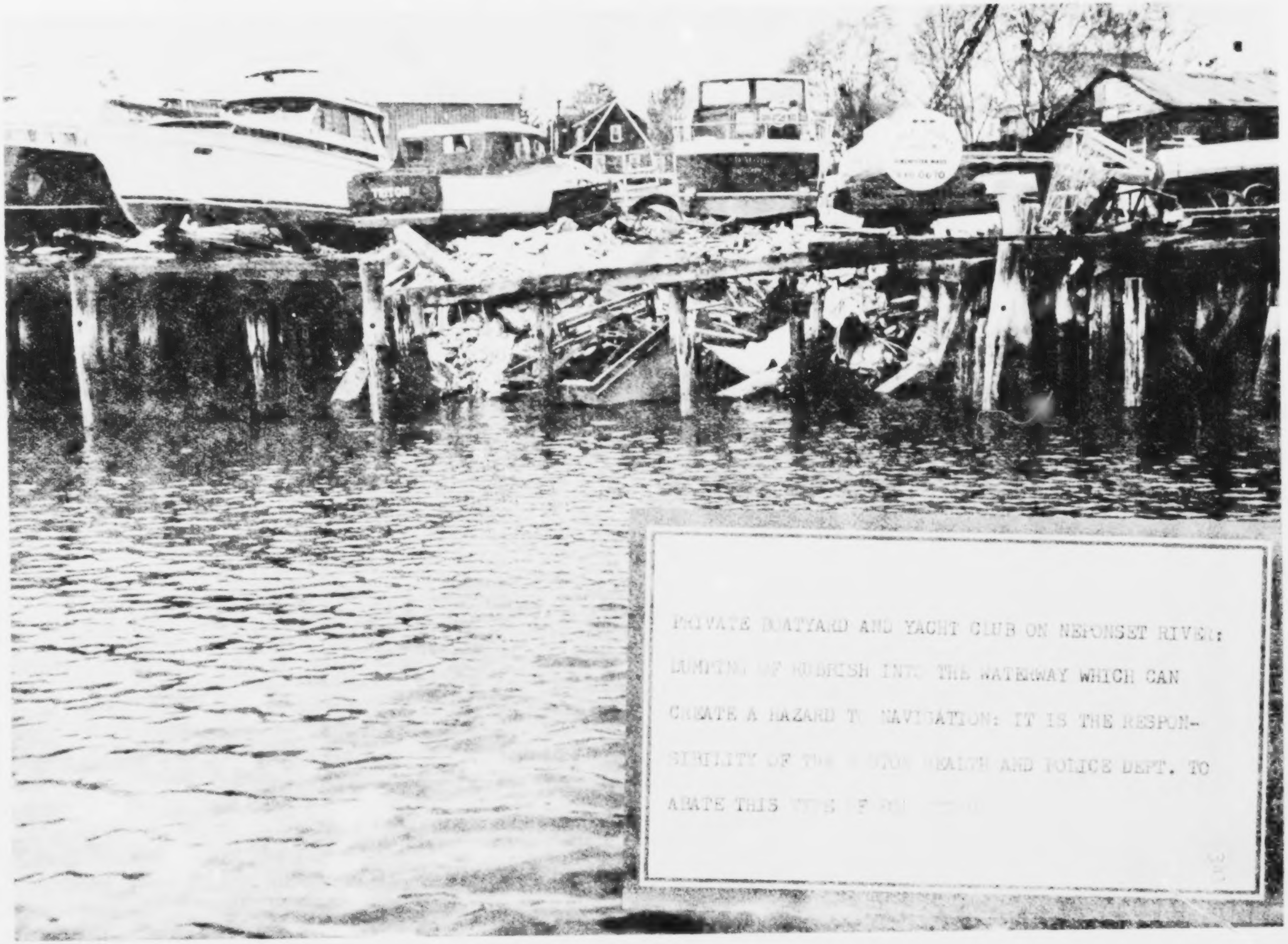
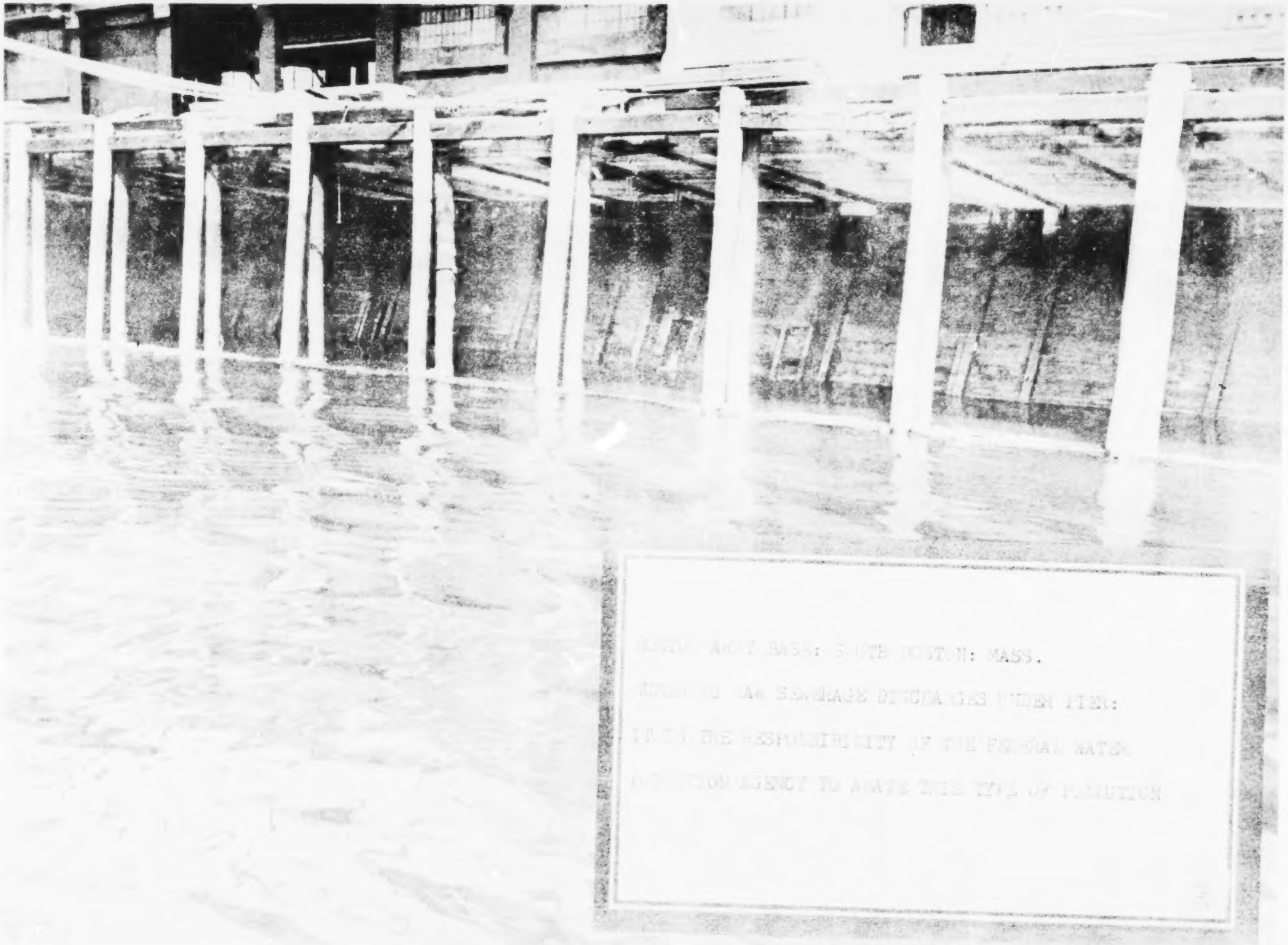


BETHLEHEM STEEL SHIPYARD: EAST BOSTON

OBSERVE PETROLEUM AND CHEMICAL POLLUTION OF HARBOR. IT IS THE RESPONSIBILITY OF THE COAST GUARD AND BOSTON POLICE DEPT. TO ABATE THIS TYPE OF POLLUTION



PRIVATE BOATYARD AND YACHT CLUB ON NEPONSET RIVER: DUMPING OF RUBBISH INTO THE WATERWAY WHICH CAN CREATE A HAZARD TO NAVIGATION: IT IS THE RESPONSIBILITY OF THE BOSTON HEALTH AND POLICE DEPT. TO ABATE THIS TYPE OF POLLUTION.



BOSTON ARMY BASE: SOUTH BOSTON: MASS.

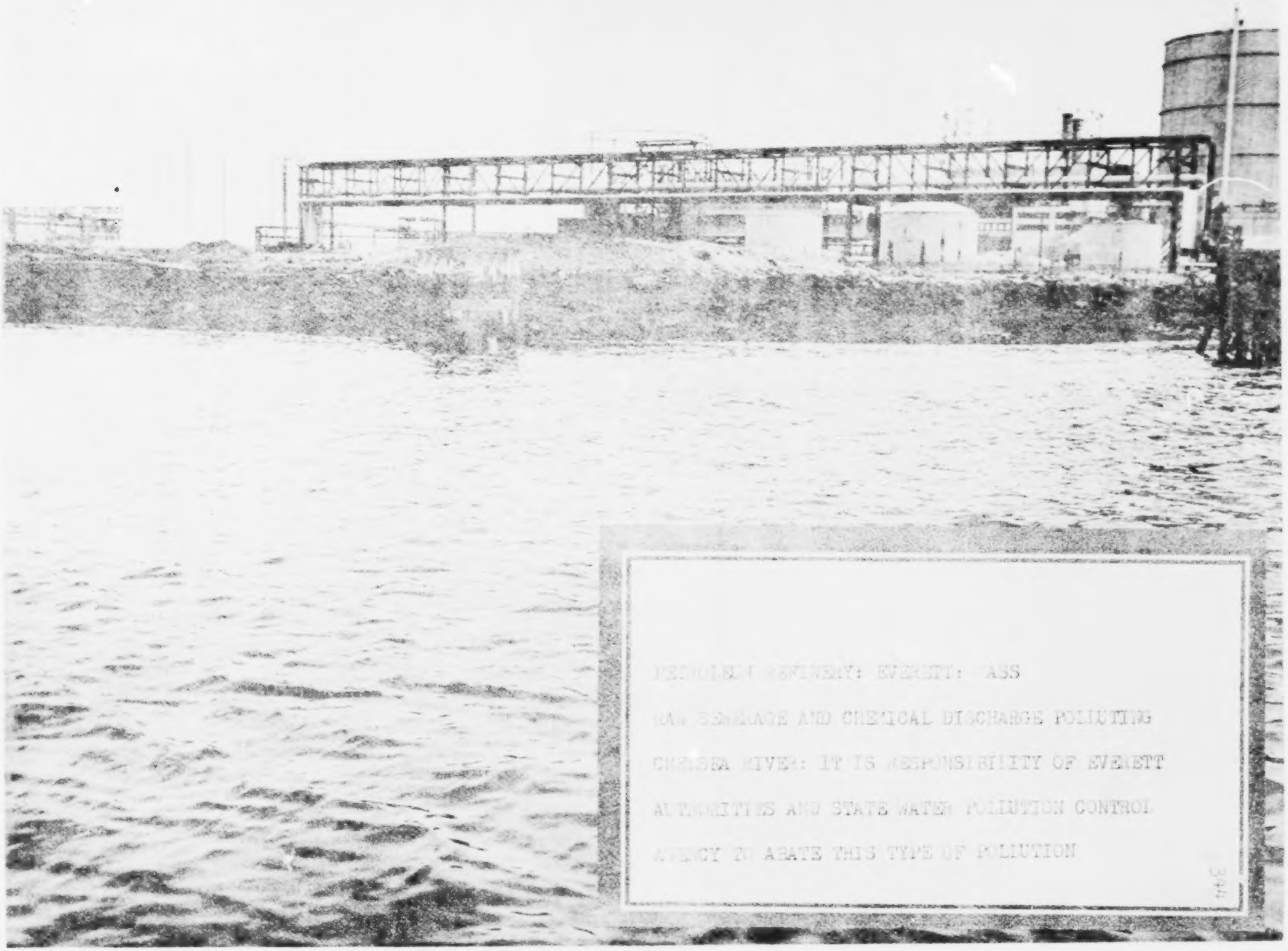
NUMEROUS RAW SEWERAGE DISCHARGES UNDER PIER:

IT IS THE RESPONSIBILITY OF THE FEDERAL WATER

POLLUTION AGENCY TO ABATE THIS TYPE OF POLLUTION

PETROLEUM REFINERY: CHELSEA: MASS:

RAW SEWERAGE AND CHEMICAL DISCHARGES INTO CHELSEA RIVER. IT IS THE RESPONSIBILITY OF THE CHELSEA AUTHORITIES AND STATE WATER POLLUTION DIVISION TO ABATE THIS TYPE OF POLLUTION.



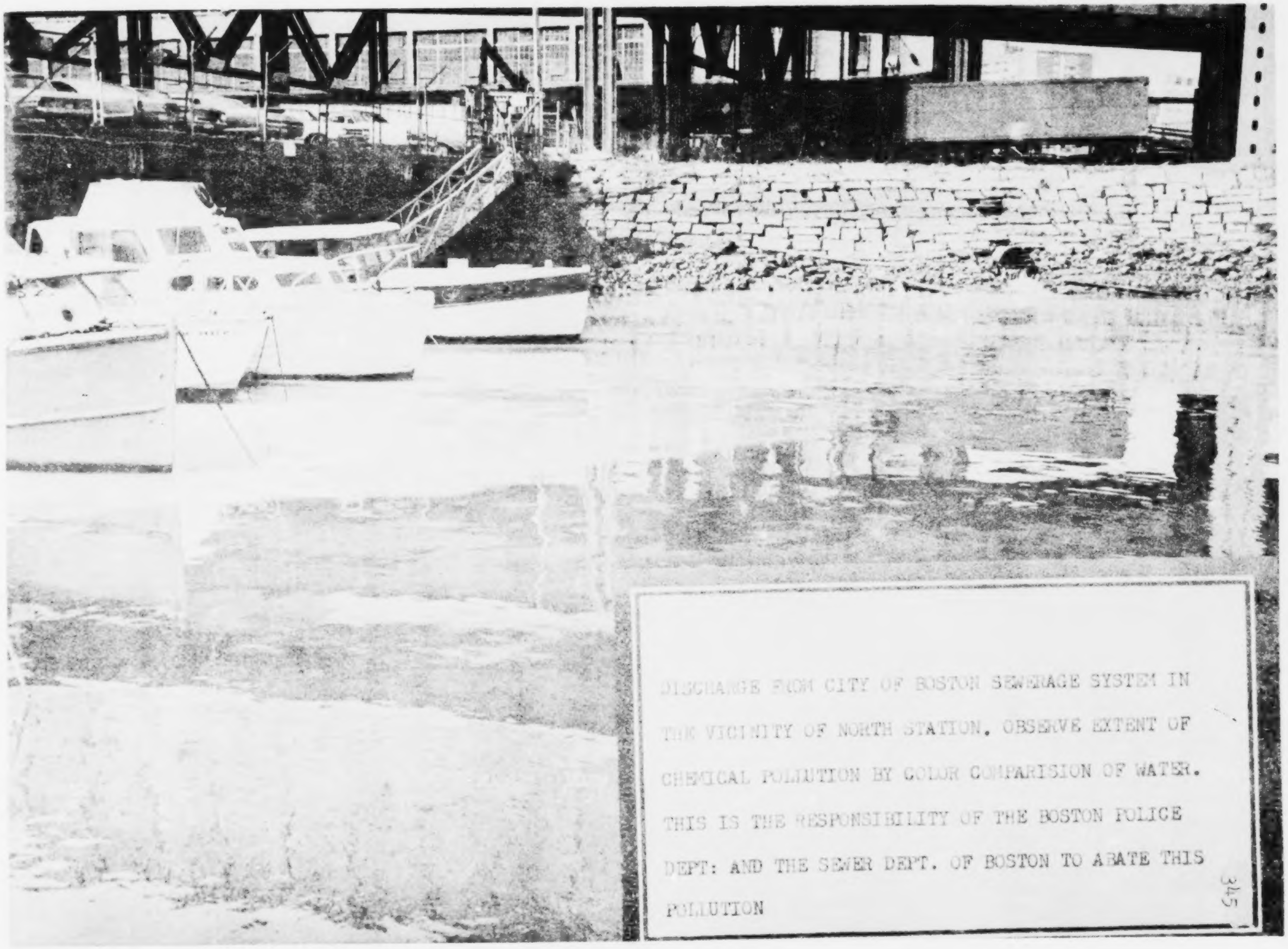
PETROLEUM REFINERY: EVERETT: MASS

RAW SEWERAGE AND CHEMICAL DISCHARGE POLLUTING

CHELSEA RIVER: IT IS RESPONSIBILITY OF EVERETT

AUTHORITIES AND STATE WATER POLLUTION CONTROL

AGENCY TO ABATE THIS TYPE OF POLLUTION



DISCHARGE FROM CITY OF BOSTON SEWERAGE SYSTEM IN THE VICINITY OF NORTH STATION. OBSERVE EXTENT OF CHEMICAL POLLUTION BY COLOR COMPARISION OF WATER. THIS IS THE RESPONSIBILITY OF THE BOSTON POLICE DEPT: AND THE SEWER DEPT. OF BOSTON TO ABATE THIS POLLUTION

MDC SEWERAGE PUMPING STATION AT CHELSEA BRIDGE.

STORM SEWER OVERFLOWS AND PARTIAL CONTINUOUS FLOW OF RAW SEWERAGE THAT IS ONE OF THE MAJOR SOURCES OF POLLUTION OF THE CHELSEA RIVER

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the beaches which were on the borderline for several years. I think the results showed that we had to put in chlorination and diversionary equipment, and I think they are over the hump in Chicago. But I'll tell you, when you talk about this, it is not very easy to sit in a little room with those figures and decide whether you are going to risk a hotter, longer summer than you can imagine by closing the beaches.

Now, last summer we went to New York City and I don't really think we were welcome in New York City with open arms. When you close the beaches - and the counts resulted in all the beaches in Staten Island being labeled as polluted and about half of Coney Island was labeled as polluted and not fit for swimming - well, I think this is a very hard judgement that you have to take. Now, let me make our position clear here. We are here, as far as the Secretary is concerned and as far as I am concerned, on Section 10 of the shellfish jurisdiction; and we will not do and we cannot do this beach analysis until we are asked by your State authorities. As far as the Federal laws are concerned, this is a State and local matter - although the New York situation and the Chicago situation were both interstate and we had jurisdiction. We don't have jurisdiction on that here.

Are there any comments or questions?

MR. YASI: Mr. Reid, I happen, I guess, to be one of the fortunate ones you talk about living in a northshore community, Swampscott, and our town beach hasn't been open in three years. I just thought you might like to know that.

MR. REID: All I can say is shame on you, sir.

MR. YASI: Let me ask you a few more questions, and I don't mean to make this sound like I am arguing with you, because I am not. I take it your department issues the permits - the building department for the city of Boston?

MR. REID: Yes.

MR. YASI: May I ask you what action the city has taken through your good office concerning the issuing of permits for industrial residential expansion as this expansion may relate to further "degrading" of the harbor area?

MR. REID: Well, fortunately, the national trend of industry has solved that problem for us. We face the facts that most of our building in the area is not industrial in nature. We are rather an insurance and apartment city. Where that has occurred, where we have large plants in South Boston Dorchester area, we have seen to it that their sewers connected or tied into the city sewer system. I don't know whether I did bring to your attention, to your division, a couple of the major industrial polluters. But as far as any permits being issued, they were only for demolition permits last year and we required that they tell us where the debris was going to be taken. I heard reference made this morning to the burning of Boston demolition wastes on barges. Please be assured that all of our demolition debris is handled by private contractors and not by the city, and it is taken to privately-owned dumps. To the best of my knowledge, we have never issued a permit that was condusive to endangering public health or safety.

MR. YASI: Thank you. I might say that Chief of Sanitary Engineering for the State Health Department is still present and he probably would be glad to discuss it with you. I think that Mr. Collins would be delighted to discuss the test that you have suggested.

MR. REID: As I perfaced my remarks, I am neither a doctor nor an engineer; I am a teacher and I don't care what the figures and statistics show. The supreme test is to go and swim in it. I don't care; a normal human being with adequate sensory organs can tell what he is in. If his eyes are working he can see what he is in. It gives me a source of great tragic amusement to read that now we have Pleasure Bay at South Boston, which is a boom to the poor, you go there and find yourself swimming in toilet tissue. To me, there is no excuse for it.

MR. YASI: Well, Mr. Reid, I honestly don't feel you should go without my saying something, because you have raised a very touchy situation with me, as one of the conferees here, and I think that a situation like that ought to be explored tomorrow and not next week. Whatever you think we can do with that or about it, you must have to call me - never mind I will call you.

MR. REID: Unfortunately, at the moment, I think the only thing we can do is inform the public of what they are getting into. I can't offer any mechanical solution. I was informed of how there are close to 90 outfalls here. When you bring your children to get them suntanned, they are swimming in sewage. I don't impune your integrity to get a solution. I am sure that you would personally do it today, if not tomorrow, and I know there is no easy solution for it. It is the municipal and government sewage system which is contributing, in my opinion, as the major source of pollution. How do we get around it? Well, here is a $450 million or a $470 million plan that isn't going to be accomplished in a week or two weeks or possible 10 years. How long did it take to drill from Weston to Chelsea? I have no idea. But the immediate situation calls for someone to tell the people the exact condition of the beach. They then can make a personal decision as to whether to go or not. Or at least they have been forewarned. And you can go to an area like this and talk about worms and other things until you are blue in the face, and we can draw fine degrees on this with considerable knowledge, but someone has to break it down so it can be understood by those who are not quite so knowledgeable.

MR. YASI: I agree to this extent, Mr. Reid, that until my particular town - and I hope the press won't use my town as an example - but until my particular town had its beaches "closed," there was very little interest in this situation. I mean in the present-day situation, because there has been a history of interest in my town for abating its pollution, but very little interest in today and what has to be done tomorrow and the next day. But there is a great deal of interest now and I am certain that my town will come through with its implementation in the time required. So I think that much of what you say has a bearing here. However, this should be looked into.

MR. REID: Well, my house is located in plain view of the polluted beach for the past 12 or 15 years and nothing was done there. But we haven't had a drowning in the Charles River since it was closed. So maybe there is some compensation for the loss of a beach, but it will take more than just a beach being closed, and I would dare anyone in authority to put a "no swimming" sign on the South Boston beaches. I know that I wouldn't have the courage to do it.

CHAIRMAN STEIN: They did it at Coney Island, sir.

MR. REID: There are no other forms or recreation here than swimming and this is what would frighten me. What do these kids going to school do in the summertime if they are not going to have access to the public beaches? We can't build enough pools. It would be wonderful. But we can't build enough to handle all the children in the city.

CHAIRMAN STEIN: By the way, when you say there may be no drownings in the Charles River, well, they managed to pollute a river around the metropolitan area of Washington, but they also managed to go up above to Great Falls and drown themselves. So they just drown in a different place.

MR. REID: I didn't intend my remarks to be construed to be critical of anyone. But the day for blaming you or the other guys deteriorates is over, and I think now something should be done before it any further.

MR. KLASHMAN: Mr. Reid, I just want to explore something with you here, but first I want to thank you for the statement. You have mentioned in passing that the city doesn't have jurisdiction over certain building or certain areas. Could you explain that a little more?

MR. REID: It is included on page 2 of the limitations that we have in Section 107, Chapter 479, of the General Laws.

MR. YASI: Excuse me, Mr. Chairman, is these another copy of this?

CHAIRMAN STEIN: I just have this one that he gave to the conferees.

MR. REID: It says, "The provisions of this code shall apply to every building or structure hereafter erected in the city of Boston, except public highways, railroad or railway bridges or trestles, quays or wharves, buildings owned and occupied by the United States or the Commonwealth, railroad structures and stations used primarily for railway purposes, voting booths erected and maintained by the Board of Election Commissioners, prefabricated metal tanks, etc." Now, we have been rapped in Court for the inclusion of buildings owned by the United States or the Commonwealth. I have taken cases to court and been told that authorities have also construed those to be owned by the Commonwealth, like the MBTA, which is out of our scope, and the Massachusetts Port Authorities is out of our scope and practically all of the Government Center.

MR. KLASHMAN: Mr. Reid, I would like to make something clear; I can't speak for the State. But as far as the Federal Government is concerned, we have an Executive Order and also have legislation which directs us to take action on any Federal discharges, and we really, honestly are trying to do this. We have a list in our report. If you know of any that we don't know about, we would like very much to hear from you on this.

MR. REID: I know this of my personal knowledge.

MR. KLASHMAN: As far as the State is concerned, by the same token, if you know - and I can't speak for Mr. Yasi, but I am quite sure he is interested - if you know of any facilities that are causing problems he is the one to go to on this.

MR. REID: I know on a personal basis, I can always get cooperation, but I can't go to the airport--and here is a major area--and we have no legal right because it is outside the scope of our code. I know, from my own personal knowledge, that the Government agencies are cooperative and the Captain of the Navy Yard. I had a picture of three outfalls to be published and they were marked as a source of pollution. I asked him to do an analysis of the pollution. Well, you couldn't read it, it was so slight. I sent both the Captain and the newspaper concerned a letter apologizing. I know that the Government is cooperative because I think our team hadn't gone into see him, and we just took the pictures of the outfalls.

MR. KLASHMAN: I am just trying to explore those areas that may be untouched. You think there is a problem with the railways?

MR. REID: There is a problem at the moment at Fort Point Channel and the New Haven is a contributor to it. We blame the private owner. We did a dye test and found out he was, in fact, tied into a public sewage and was just discharging back into the channel. If I am not mistaken, there was evidence of the railroad yard contributing to the pollution, but I don't think it was as major as some poeple would think it would be.

CHAIRMAN STEIN: I don't have jurisdiction over voting booths. I don't know about Massachusetts, but where I come from in Virginia a lot of stuff comes out of those places. The only thing I can say, Mr. Reid, is that the kind of expression of the pollution problem that you have is the kind of thing that makes us keep going in this business. It shows us there is someone here really facing up to the pollution problem and knowing what it is and what we have to do. I fully agree with you on the problem of building code restrictions, the problem of not being able to get into a Government building and the problem of not being able to get into a Government building and the problem of not being able to get into an airport. Believe me, this is something that is not peculiar to the Boston metropolitan area. This is just something that we live with all the time. We have to meet it case-by-case. Also I think the other statement you made is exactly right - that you don't need these refined tests to tell you when a beach is polluted. I believe we proved the obvious - that people who are there surely know what these water conditions are and very often they are so gross that they are very well aware of them visually.

MR. REID: Thank you for your attention.

CHAIRMAN STEIN: Thank you for your statement. Mr. McMahon?

MR. McMAHON: I would like to now call on Mr. Herbert W. Marcus who is the Chief of Public Relations for the Winthrop Citizens Group.

HERBERT W. MARCUS
CHIEF OF PUBLIC RELATIONS
WINTHROP CITIZENS GROUP
WINTHROP, MASSACHUSETTS

MR. MARCUS: Mr. Chairman, Mr. Stein, Mr. Klashman, Mr. Yasi, Mr. McMahon, my name is Herbert Marcus and I am the Chairman of Public Relations of the Winthrop Citizens Group. After listening to so many different agencies, I wonder what agency we come under. In order to save time, we would like to thank you and the Secretary of the Interior for the conference and without his pressure no action would have been taken at Deer Island. In the latter part of April, Les Carpenter from the Herald Traveler, Washington Bureau, released to Boston that a meeting would be held in Boston, and we immeidately compiled all the different clippings from the greater Boston papers and also the bacteria reports, which were sent to the Boston and Washington office. On May 3, in reference to Mr. Reid, the bacteria in the Bay of Winthrop went from 11,000 bacteria count to 46,000 bacteria count. Now, I have offered to the conferees a release of the Sunday transcript and I will now read it.

"Over 1,000 local homes were flooded over the weekend as the result of heavy rains and sewage backing up into cellars. All available men of the highway and sewer departments were called upon and have been working around the clock in order to remove the water from the cellars of local homes.

"Highway Superintendent Bob Hodgkins said the first call for assistance came from a resident at 149 River Road at 12:30 a.m. on March 17. In this area and in others around town raw sewage had backed up into the basement. Hodgkins stated that in normal times Winthrop's nine-foot sewerage line to the MDC pumping station at Deer Island only carries a level of 1 to 2-foot of waste.

"Early Monday morning, town workers opened the MDC pipeline to find it filled to the maximum 9-foot level. In the interest of the helath of the town, Health Officer Philip Vitagliano made a personal visit to the MDC facility to acquaint them with local conditions. He was, however, informed that all their pumps were operating, but an apparent overflow from the lines of surrounding communities had slowed down the rate at which the Winthrop pipe could dispose of its discharge.

"Still under construction is a separate pumping station for the Winthrop line, and it will be at least another year before it will be completed according to MDC reports.

"Highway and Sewerage Department workers reported a serious situation was averted when after the turn of the tide and a decrease in the rain, the level of the MDC pipe dropped from the 9 feet to 8 at 3:00 p.m. on Monday.

"Meanwhile, all 13 pumps of the highway and three pumps of the fire department were pressed into service to handle the calls for assistance from local homeowners who were getting the flooding from the surface rainwater seepage into their basements.

"By noon on Monday there was a waiting list of over 250. On

Tuesday morning the list had decreased to around 75 homeowners in need of assistance.

"Some of the hardest hit areas were Sewall and Nahant Avenue, Grovers and Cliff Avenue, Sunnyside and Plummer, Pico Avenue, Woodside Avenue and several areas in Point Shirley. Many calls were made by the fire department to homes that had flooded basements that contained gas-water heaters."

These areas are the $30,000 to $50,000 homes. On November 8, 1967, after permission was granted by the MDC, a tour of duty was led by our committee. At that hearing we questioned Mr. Hanlin, who is the superintendent of the sewerage plant in Winthrop and Nut Island, and we asked him whether it was possible to chlorinate the outfall, and he said that the Winthrop facility will be built in about 400 days, and the pump facilities will be stored in that building. As President of the Shipbuilders Union during the war, I knew we had many tremendous large compressors on the wharve. And we said, 'Why don't you have a temporary supply of compressed air pumped to the plant and put the whole plant in operation?' We are grateful for the results and what has taken place, but we have been wondering whether the MDC has connected too many cities and towns into Deer Island, and, even after it is completed, we really feel that the Deer Island facility will be inadequate to take care of the sewage and the surface water from the 52 cities and towns.

Mr. Stein, I have released the paper of May 3 to your Department and all the clippings of all the news media. I want to make a statement now that we did not believe that the equipment could be put into operation, and it has been done through the efforts of your Departmen forcing the MDC to acquire the services of the experts from the school of water and wastewater. Because without this assistance, I am sure nothing would have been done on Deer Island, and I want to thank you and have you extend that to Secretary Udall.

CHAIRMAN STEIN: Thank you very much, sir. Are there any comments or questions? Thank you for your statement, sir. Mr. McMahon?

MR. McMAHON: I would like to call on Mr. Charles Archdeacon.

CHARLES ARCHDEACON

WINTHROP CITIZENS GROUP

WINTHROP, MASSACHUSETTS

MR. ARCHDEACON: Mr. Chairman and conferees, ladies and gentlemen, I will only take a few minutes to add to what Mr. Marcus, Chairman of the Winthrop Citizens Group - which is a nonpolitical organization, which is only interested in civic matters for the betterment of the town - has said. There are many homes along Washington Avenue and runs to Point Shirley bordering along the shoreline of the harbor directly to Deer Island. During the months of June to October many of these homes are discolored on the exterior from the fallout from the treatment center. They have complained to the State, and the State has taken little action in which they have talked with these people about the homes. This month alone, May 1968, on three different nights - that is when the odor appears--the odor was obnoxious and worse than ever, even though the treatment plant is in operation.

Now, on November 8, 1967, Mr. Kotelly of the Federal Water Pollution Control Administration of the Boston office was invited by the Winthrop Citizens Group to take a tour at the Deer Island pumping station, along with members of the group. Mr. Kotelly told the Winthrop Citizens Group that he or his office was never invited by any State agency to sit in on a meeting or to take a tour of the Deer Island Station. It was due to this action of the Winthrop Citizens Group that the Federal agency became aware of the situations at the Deer Island pumping station.

In conclusion, I feel that this meeting today, called by the Secretary of the Interior Mr. Udall, if it had not been called this morning, little or no action would have been forthcoming.

Thank you.

CHAIRMAN STEIN: Are there any comments or questions? Now, after consulting with our technical staff, it says that the discoloration comes from rotting vegetation and hydrogen sulphide and this is something that you will have to bear with. But as far as pollution control, I am sure the agencies are going to follow this through, but I don't want - and I hope I am speaking for the technical staff here--I don't think we want you to have any false hopes or to have the notion that this problem is completely solved.

It may be helped by the Deer Island plant. If it isn't, then, of course, obviously, this thing will have to be looked at further.

MR. ARCHDEACON: Sir, the plant was in operation two weeks ago and several homes were discolored.

CHAIRMAN STEIN: Sir, what you have here is an organic material, which is a legacy of a long period, and you are not going to correct it overnight. If the plant goes into operation, the question here is: while the plant is in operation, over a relatively long pull, whether this is going to alleviate the situation. I am sure the people of the State, the local and Federal authorities have all been looking at this problem with interest. I ask you not to leave with the false impression that because the switch has been pushed at the plant you are not going to have that problem anymore. But they are proceeding and examining it step by step and seeing just what the Deer Island plant will accomplish. Thank you very much.

MR. YASI: Mr. Chairman, I want to make sure of the last remark of Mr. Archdeacon and let me see if I recall it. You said, "If this conference had not been called, nothing would have been forthcoming." Is that fairly accurate, Mr. Archdeacon?

MR. ARCHDEACON: Yes.

MR. YASI: Well, with all due respect to you, sir, and Secretary Udall, I want to say for the record we were delighted to have Federal authorities here on the Boston Harbor situation. I think, for your information, you realize that this is pretty much a local and State responsibility, and I think you will recall, Mr. Archdeacon, that Governor Volpe, some six years ago, said that something should be done right away. As a result of that you have good officers and others. So, in fairness to the State and local authorities, I didn't think that statement should stand alone. Thank you.

MR. ARCHDEACON: I am well aware of it now.

CHAIRMAN STEIN: Are there any other comments or questions? Mr. McMahon?

MR. McMAHON: No.

CHAIRMAN STEIN: I think we possibly can push on to a conclusion. But, again, on the basis of past experience, lets take a 10-minute recess so that the conferees can come back refreshed.

MR. McMAHON: May I add, if I have missed anyone, does anyone wish to make a statement at this time? No? Then I will.

THOMAS C. McMAHON, DIRECTOR, DIVISION OF WATER POLLUTION, WATER RESOURCES
COMMISSION, BOSTON, MASSACHUSETTS

Thomas C. McMahon

Mr. Chairman, ladies and gentlemen, my name is Thomas C. McMahon, Director of Water Pollution Control, under the Massachusetts Water Resources Commission, in the Department of Natural Resources. Our agency was created under Chapter 685 of the Acts of 1966 with the responsibility to enhance the quality and value of the water resources of the Commonwealth and to establish a program for the prevention, control and abatement of water pollution. Three companion pieces of legislation provided for a State bond issue of $150 million to assist cities, towns and districts in the construction of waste treatment facilities and two tax-inducement provisions for industries constructing their own treatment works.

Since the passage of these Acts, Massachusetts has adopted standards of water quality on all interstate, intrastate and coastal and marine waters. The interstate portions have been approved by the Federal Department of the Interior, thus making these Federal standards as well as State and providing to this State the maximum Federal grant percentages on eligible projects throughout the Commonwealth. An implementation schedule for corrective action has been established for some 230 industries and 130 communities in the State and letters of intent indicating willingness to comply have been received from 95 percent of those contacted. The total estimated price tag on a Statewide consideration is $.5 billion with approximately one-half to be cost-shared by the Federal Government, one-quarter by the State and the remaining one-quarter by local financing.

Since corrective amendments to the Massachusetts Clean Waters Act, grant offers have been made to 11 communities representing some $13 million worth of construction. This figure will reach $20 million by the end of this fiscal year, including the prefinancing of $4 million of the Federal share due to cutbacks on Federal appropriations below the authorizations of the Clean Water Restoration Act of 1966.

Testimony at this conference today has produced a number of interesting facts, opinions and recommendations, all emphasizing the serious problems of pollution of Boston Harbor. I would like to comment on several of these at this time.

(1) There has been good cooperation on an interagency basis for developing effective programs to solve all of the pollutional components of Boston Harbor problems. Despite this, increased positive action will be necessary in order to attain many of our water quality goals in the future. We certainly appreciate the timely recommendations of the Governor on establishing an investigating committee to accelerate this purpose.

(2) It is the opinion of our Division that the SB classification of the Outer Harbor and neighboring areas will be met when the Deer Island and Nut Island treatment plants become operational and the Moon Island facility is phased out.

(3) The Massachusetts classification of the Boston Inner Harbor have been developed on wet weather considerations due to the enormous magnitude of combined sewer solutions, both economically and technologically.

(4) The Federal report appears to pinpoint the majority of problems of the area and should constitute a valuable reference work as a baseline depicting the harbor problem at its worst, thus ensuring a future opportunity to estimate progress on a continuing basis.

The report of the firm of Camp, Dresser and McKee for the city of Boston is a most comprehensive and outstanding engineering document and has been endorsed by our Division as a long-term solution for the greater Boston metropolitan complex.

A conference of this nature, I feel, can be of significant consequence if reasonable recommendations can be developed into an achievable action plan. Nevertheless, culmination of an overall cleanup of the harbor transcends the present jurisdictional and financial responsibilities of the Federal Water Pollution Control Administration and the Massachusetts Clean Waters bond issue authorizations. Thus, the financial ramifications are many, and before embarking on a massive civil works project of this size, I would presume alternate Federal and State financial assistance should be explored. I would also like to point out that cost-benefit ratios delineating project desirabilities go far beyond the shellfish restoration benefits and encompass all of the commercial, industrial, recreational, transportation and aesthetic values inherent in a total water quality enhancement program.

In conclusion, it is most apparent that there is a tremendous need for continuation of cleanup efforts to provide for the maximum use of this priceless metropolitan resource. Fulfillment of an efficient and progressive program of corrective action in the harbor and tributary areas will provide for the ultimate and optimum utilization of these waters for all legitimate purposes. Thank you.

CHAIRMAN STEIN: Are there any comments or questions? I would like to just say one thing for the record. The reference that there is cost-benefit ratio there, while this has been proposed, I don't think it has ever been the basis for Federal regulations or any State regulations. That includes all 50 States that I know of.

MR. YASI: Mr. Chairman, I take some disagreement on that point. I would like to point out that the cost-benefit ratio to project desirabilities is for the shellfish restoration. I think that is the point the Director was making, without putting words in his mouth, was that was the basis for this conference--the cost-benefit situation as it relates to the economic devaluation of shellfish industry. I think that is the manner in which it was intended.

CHAIRMAN STEIN: I think what you are saying is essentially correct. I don't think the statement was, in any way, related to cost, but there has to be substantial injury to the shellfish, and the only reason the figures were put in, as far as I can see, is to indicate "substantial." But, obviously, any benefits to be gained from pollution cleanup in the Boston Harbor area go way beyond shellfish benefits. The only point I am making is that is the basis of Federal action. As far as I know, State laws have not put pollution control on the cost-benefit operation. Is it is polluted and violates the law, it has to be cleaned up.

MR. YASI: The Director is more capable of defining his statement than I am.

MR. McMAHON: I was referring to Deep Tunnel recommendations as far as the proposals of the Boston consulting firm. The point I wanted to make was that before a program of this magnitude is undertaken, I think it should be very carefully evaluated from a total improvement standpoint, including transportation and many of the other things, rather than strictly shellfishing.

CHAIRMAN STEIN: I agree with you on what you say. But if you are getting into technical terms - the reason I say that is because I think that it is vitally important--if you are going to check this in terms of transportation or something else i.e., schools, highways, or what have you, this is the kind of judgement you make in any Public Works project. As for the engineers from Camp, Dresser and McKee who prepared that Deep Tunnel plan - I think it is an imaginative plan that has tremendous possibilities - point out, the bringing of that plan to fruition for Boston and several other metropolitan areas would be to go to Washington and coming up with some Federal support which isn't existing now. The one thing that we--and I say we--have resisted through the years in trying to enlist Federal support for water pollution control is any notion of cost-benefit ratio. A lot of people are always proposing that we have that; and this is the one thing that we do have, and, as far as the context in which it is used, I think we are in fair agreement.

MR. McMAHON: I would agree that the cost-benefit ratio shouldn't be used. However, you are talking about $.5 billion - and I think it should be carefully evaluated.

CHAIRMAN STEIN: All right. That is why I said this for the record and I appreciate your viewpoint. Are there any other statements or comments? If not, if we may have your indulgence, we will recess for 10 minutes and then reconvene and see if we can wind this up.

(whereupon a recess was taken.)

CHAIRMAN STEIN: May we reconvene? I will try to come out with the tentative conclusions and recommendations, and then we will give the conferees an opportunity to comment.

(1) The waters of Boston Harbor are polluted over some shellfish beds.

(2) This pollution results from the discharge of untreated or inadequately treated wastes from municipalities, industries, combined sewer overflows, tributary streams, Federal installations specifically: Boston Naval Shipyard, Navy ships berthed in Boston Harbor, Coast Guard's

Base Boston, Mike Ajax Site B-36 (Hull), Watercraft wastes and pollution caused by debris and refuse.

As a result these waters are polluted by bacteria, suspended solids, nutrients and organic matter causing an oxygen demand.

(3) As a result of the existing or potential pollution of these waters, the Commonwealth of Massachusetts, under the cooperative agreements governing the National Shellfish Sanitation Program, has completely closed some areas for the direct marketing of shellfish and restricted additional areas so that the shellfish must be processed through a depuration plant.

(4) These closures have caused substantial economic injury resulting from the inability to market shellfish or shellfish products in interstate commerce.

(5) The pollution of these navigable waters is subject to abatement under the provisions of Section 10 of the Federal Water Pollution Control Act, as amended.

(6) In some areas, the pollution of these waters has resulted in an unsightly appearance, the excessive growth of aquatic plants, objectionable odors, sludge deposits and limited use of the waters for recreational bathing, boating and esthetic enjoyment.

(7) The State water pollution agency has taken appropriate action to date under State law to abate pollution. The delays in abating the pollution are due to the very complicated nature of the problem.

(8) The conferees agreed that a tehcnical committee be appointed to be chaired by the Chairman of the Massachusetts Resources Commission, the Federal Chairman of the New England River Basin Commission and the Regional Director of the Federal Water Pollution Control Adminis-

eration. This committee will be a technical committee and shall be empowered to appoint subcommittees to enlist and support members. They will make an evaluation and the scope of the evaluation will include but shall not be limited to:

(a) A status report of pollution abatement as required by the Division of Water Pollution Control for all municipal and industrial contributors listed in the Massachusetts Standards of Water Quality, including Federal installations as well.

(b) A report of the attainment of the water classifications by the several municipal and industrial pollution sources.

(c) The delineation of an overall plan to control the dumping of garbage or refuse along the shores and in the harbor.

(d) A program to improve dump sites and correct the problem of sunken vessels, deteriorating piers and debris.

(e) Investigation of suitable Federal and State laws to control oil pollution and wastes from watercraft.

(f) Study of the Deep-Tunnel proposal from a water quality standpoint as well as consideration of the most feasible means of financing such a project.

(g) Plans to assist Federal authorities in the implementation of treatment works from Federal installations.

The next point is that the Federal installations will be required to meet this time schedule.

The Nike Ajax Site, B-36, will be required to make a determination whether it will join the municipal system or provide its own installation in six months and have its remedial system or facility put in by 18 months from this date.

Closing Statement

The Deer Island light station will be given six months to put in a temporary facility. The Coast Guard Base Boston station should be completed by May 1970.

Base Boston Vessels in Port is to have its remedial facilities constructed and have the sewer line to collect sanitary wastes from ships to be completed by May 1970.

The Navy Shipyard should have its remedial facility for collecting and controlling its wastes from machine shop and tank-cleaning operations completed by July 1969.

We will be having progress meetings at six month intervals or thereabouts to get the reports of the technical committee and evaluate progress being made from all sources and determine whether they are going to refine or go ahead with the program. The technical meetings or the conference may be reconvened upon the call of the Chairman. Are there any comments?

MR. YASI: Please, Mr. Chairman, may I for the record state that the Commonwealth objects on a strictly procedural legal basis to item 4, insofar as item 4 relates to the "substantial economic injury." Also under item 4, until we know the method by which the $1.3 million was arrived at and whether, in fact, this was actually lost or a graduated economic loss, and we object to that figure procedurally.

Item 5, "Pollution of these navigable waters is subject to abatement under the provisions of Section 10 of the Federal Water Pollution Control Act, as amended," we object again strictly on a procedural basis. The purpose of these objections is simply to insure, so far as it may be possible, under Federal and State law, that the Commonwealth of Massachusetts does not surrender its jurisdiction whether it be exclusive or concurrent and we will waive no rights.

CHAIRMAN STEIN: Thank you.

MR. YASI: Thank you, Mr. Chairman. It has been a pleasure having you here today.

CHAIRMAN STEIN: Thank you. Are there any other comments? The record should show and let me point out that the $1.3 million was not used in the summary; that is just a figure in the book.

MR. YASI: Then strike my reference to the $1.3 million as it relates to the summary, but make it stand as it realtes to the report please.

CHAIRMAN STEIN: Are there any other comments or questions? We would like to thank you all for coming and the people who are here for bearing with us. We appreciate the opportunity of working with Massachusetts on this problem, and I think we have progressed a long way forward. Now, again, I thank particularly the conservation and citizen groups who were here. We have a complicated problem from the State, city and Federal Government point of view. It is up to everyone to really handle this Boston Harbor situation.

You have to recognize that we have a legacy of several hundred years that we have to deal with here, and we are hopeful to handle this through this cooperative technical committee by holding periodic meetings. I am sure you can see almost the end of the tunnel in sight. We have some tremendous plans on the line, but it is going to take sometime before we can iron out some of these very, very difficult problems that you heard discussed here today. I ask you to cooperate on a day-to-day basis with the municipal and State officials, along with us, to see if we can work out the joint solution. I think we are all in this together. Our hands are extended to you, and I ask you to just try to meet us half way. Thank you very much and we stand adjourned.

(Whereupon, at 5:15 p.m. the conference adjourned.)

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